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29 November 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 170

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GOVERNMENT ACTS ON PLANS FOR URANIUM ENRICHMENT SITE

Details of Decision

Canberra THE AUSTRALIAN in English 7 Oct 82 p 1

[Text]

THE Federal Government yesterday took a big step towards setting up a uranium enrichment industry, to cost at least $1000 million, either in South Australia or Queensland.

In a series of moves which immediately sparked controversy, the Government:

NARROWED down the choice of a site of an enrichment plant to either Adelaide or Brisbane.

ACCEPTED gas centrifuge technology, developed by a European consortium, Urenco-Centec, as the basis for a plant, which could treble the value of our yellowcake.

APPROVED further studies by the consortium into the feasibility of the plant.

APPROVED the project under the foreign investment guidelines providing for 50 percent foreign equity and Australian control of the plant.

The Government's decision came three days after the Victorian branch of the Labor Party demanded that a special national ALP conference be held to toughen the party's stand on the mining, export or processing of uranium.

It ensures that the uranium debate will continue to flare between now and the next federal election.

The decision was attacked by the ALP, which opposes the establishment in Australia of nuclear power plants and other stages of the nuclear fuel cycle, including enrichment.

The Opposition spokesman on the environment, Mr Stewart West, said a Labor Government would halt the project.

The Minister for Trade and Resources, Mr Anthony, and the Minister for National Development and Energy, Senator Sir John Carrick, said the Government's decision followed a recommendation by the Uranium Enrichment Group of Australia.

The group, comprising four big resource development companies, BHP, CSR, Peko Wallsend and Western Mining, has invested $5 million in a pre-feasibility study.

It has made recommendations to the Government on the choice of technology, site selection, market opportunities and the nature and timing of further work.

The group recommended the gas-centrifuge technology pioneered by Urenco-Centec, a consortium of which West Germany, Britain and the Netherlands are members.

Urenco sources in the Netherlands told *The Australian* earlier this year the company hoped to welcome Australia as a full partner by the mid-1980s, offering it access to its high technology.

Factors identified by the Australian companies in support of the Urenco technology included economic superiority, proven technical and commercial capability and flexibility for modular growth.

The Government also accepted the companies' recommendation that sites near Adelaide and Brisbane be evaluated further as they were most likely to satisfy the requirements of a plant based on the Urenco-CEntec technology.

The Treasurer, Mr Howard, said that under the Government's foreign investment policy, uranium enrichment was not covered by the 75 per cent Australian equity applying to new uranium mining projects.

Mr West ridiculed the project, saying there would be a substantial world surplus of enriched uranium for years to come.

Reprocessing

He also said the Government could not consider an enrichment plant without the establishment of a gasification plant, the second stage in the nuclear fuel cycle.

"The next step would be for a nuclear power station in Australia which would lead us into problems of waste disposal and inevitably reprocessing," he said.

"I am convinced that that is not what a majority of Australians desires."

The Friends of the Earth movement said last night the Government's decision showed a dangerous lack of realism.

Its spokesman, Mr John Hallam, said in Melbourne the Government had been pursuing a uranium enrichment fantasy ever since 1975.

The South Australian Premier, Mr Tonkin, yesterday pressed his State's case for having the enrichment plant.

He said South Australia was well-placed because it was the first to advocate use of the technology and had established strong links with the consortium.

"We can offer access to major deposits of uranium at Honeymoon, Beverley and Roxby Downs, and a central location for the processing of uranium from other parts of Australia," Mr Tonkin said.

[Editor's Note: In its report on the government action, Melbourne THE AGE on 7 October, page 1, said: "A Queensland Department of Works spokesman named a 200 to 400-hectare area between Boonah and Beaudesert, 56 kilometres south of Brisbane, and an area north of the city as sites being considered. A Government spokesman refused to give details on possible South Australian sites."

Brisbane's THE COURIER-MAIL of 7 October, page 5, reported that "Two sites in Queensland are being considered for the plant. A Queensland Works Department spokesman said one was between Boonah and Beaudesert. The other was near Caboolture."

Brisbane Site Controversy

Brisbane THE COURIER-MAIL in English 8 Oct 82 p 5

[Article by Bill Ord]

[Text]

REPORTS that a billion dollar uranium enrichment plant to produce nuclear power fuel could be built within 60 km of Brisbane, near Beaudesert or Caboolture, raised protests yesterday.

The Federal Government has announced its approval of plans by the Uranium Enrichment Group of Australia — made up of CSR Ltd, BHP, Western Mining Corporation and Peko Wallsend — to build a uranium enrichment plant costing more than $1000 million. It would have up to 50 percent foreign ownership.

The group said it had its eye on the two Queensland sites, and another in South Australia.

The Ipswich Mayor, Alderman Freeman, said: "We don't want the thing in Australia, let alone in Queensland — and smack-bang close to the state's most densely populated area, at that."

The Caboolture Shire chairman, Cr Barr, said: "It's unreal to think of establishing such a plant in or near a big centre of population, and it wouldn't do a thing for our relaxed lifestyle."

The Caboolture Ratepayers and Citizens' Association spokesman, Mr Keith Chisholm, said he believed a plant would not blend with the area's projected urban growth.

"I think if we look 20 or 30 years ahead, Caboolture will be a bit like Aspley as an outer-type suburb for Brisbane," he said.

The Beaudesert Shire Chairman, Cr Struss, said: "It just isn't our thing. I know very little about uranium enrichment and its hazards — or advantages, if there are any — but it doesn't sound like good news to me and, from the way my telephone's been running hot, the people of the shire feel the same way."

Brisbane's Lord Mayor, Alderman Harvey, could not be reached, but his deputy, Alderman Ardill, said recently that Brisbane City Council would mobilise public opinion against any nuclear plant in or near the city.

The Queensland Campaign Against Nuclear Power chairman, Mr Bruce Doyle, said the plant would subject Australia and south-east Queensland to unnecessary dangers.

The Premier, Mr Bjelke-Petersen, said: "I've always advocated the further processing of uranium in Queensland. The government put up a strong case for a nuclear enrichment plant to be established here.

"It's the logical thing to do because of our closeness to the uranium mines and our ample power resources."

The National Development and Energy Minister, Senator Sir John Carrick, said the Government had accepted the group's recommendation that a centrifuge enrichment technology developed by a British-Dutch-West German nuclear consortium be used in the Australian plant.

In this process, yellowcake uranium oxide — the basic nuclear material produced by Australia's uranium mines — is first concentrated into uranium hexafloride, a solid which readily becomes a gas known as UF6 or "hex."

Hex is injected into centrifuges spinning at very high speed which separate heavier U238 atoms from lighter U235 atoms, the basic material for nuclear fuel, which comprise about 0.7 percent of yellowcake's volume.

The U235 material is sent through a long succession of centrifuges until the proportion of U235 is increased to about 3 percent.

This enriched material is converted into small pellets which are loaded into alloy tubes for use as nuclear reactor fuel.

Democrats', ALP Condemnation

Melbourne THE AGE in English 8 Oct 82 p 4

[Text]

CANBERRA. — The Federal Government's planned uranium enrichment plant ought to be an issue at the next Federal election, the Deputy Prime Minister, Mr Anthony, said yesterday.

Mr Anthony said the likelihood that a Labor Government would close the uranium industry down was one of the factorfs to be considered when people voted at the election. He said a uranium enrichment industry would provide a "major boost to national development and employment".

Mr Anthony said peole living near possible sites for an enrichment plant — including one only 50 kilometres from Brisbane — had nothing to fear.

"There are a lot of communities around Australia that would welcome having such a big manufacturing processing plant nearby to give employment opportunities for their people," he said.

The Australian Democrats joined the Labor Party yesterday in condemning the Government's moves toward establishing a uranium enrichment industry.

Senator Siddons said it was beyond understanding that the Government should encourage a billion dollar uranium enrchment project when scarce resources could be put into "efficient and socially desirable labor-intensive or energy consrving industries".

CSO: 5100/7508

RESISTANCE FORMS IN QUEENSLAND TO URANIUM ENRICHMENT PLANT

Caboolture Opinion Survey

Brisbane THE COURIER-MAIL in English 12 Oct 82 p 14

[Article by Bill Ord]

[Text]

Nearly 90 percent of Caboolture residents were against the establishment of a nuclear-enrichment plant in the area, the Campaign Against Nuclear Power said yesterday.

It was announced from Canberra last week that the Federal Government had agreed to the location of a giant $1000 million plant near either Caboolture or Beaudesert in Queensland or at a South Australian site.

CANP's Queensland branch president, Mr Bruce Doyle, said the organisation conducted a public-opinion survey at Caboolture last weekend.

The result was: 88 percent against the plant, 5 percent in favor and the rest undecided.

He said that when asked whether they wanted a plant anywhere in Australia, 73 percent said "no" and 13 percent said "yes".

Trade Union Position

Brisbane THE COURIER-MAIL in English 13 Oct 82 p 30

[Text]

THE Queensland trade union movement would resist any move to build or operate a uranium enrichment plant in Queensland, the Trades and Labor Council assistant general secretary, Mr Ray Dempsey, said yesterday.

He said: "On behalf of the Australian Labor Party, I want to issue a warning to anyone who is contemplating investing in the proposed nuclear enrichment plant not to waste their money."

Even if the plant was built despite union action, the trade union movement was influential in the ALP and the unions would argue very strongly for operations at the plant to cease, Mr Dempsey said.

The Queensland Tram and Bus Union state secretary, Mr Tom McHenry, yesterday called on the TLC to sponsor a seminar on the proposed enrichment plant.

The union also called on the TLC to take whatever other action it considered necessary.

Mr McHenry said: "We are alarmed at the prospect of a uranium enrichment plant being built near Brisbane or anywhere else in Queensland." The ALP had undertaken that there would be no further contracts for uranium from Australia when the existing contracts ended.

He said: "We believe the spending of billions of dollars to build such a complex would make it difficult for the ALP to maintain its policy on uranium.

"It would be disastrous for the trade union movement to allow the syphoning of billions of dollars to such a project that would create very little employment in Australia.

"The money would be better spent in job creation industries," Mr McHenry said.

Mr Kruger (ALP, Murrumba) said a report that Caboolture was being considered as one possible site for a uranium enrichment plant was yet another attempt to establish industry incompatible with the area.

Mr Kruger said it appeared people in "Government circles" were desperately trying to locate industries around Caboolture and Bribie Island which were not proved to be suitable, such as a coal-loading port and a pulp mill.

But a uranium plant was the most unacceptable and it could not tie in with the environment, he said.

He said: "Redcliffe, Caboolture and Bribie are fast growing urban areas which are close to Brisbane. To have such a dangerous industry so close to the state's major population area is ridiculous. We don't want it."

Queensland badly needed a comprehensive land use study. Even then a uranium plant would not find a spot in the state, he said.

Sites at Caboolture, Beaudesert and in South Australia are under consideration by the Uranium Enrichment Group of Australia for a $1 billion plant to produce nuclear power fuel.

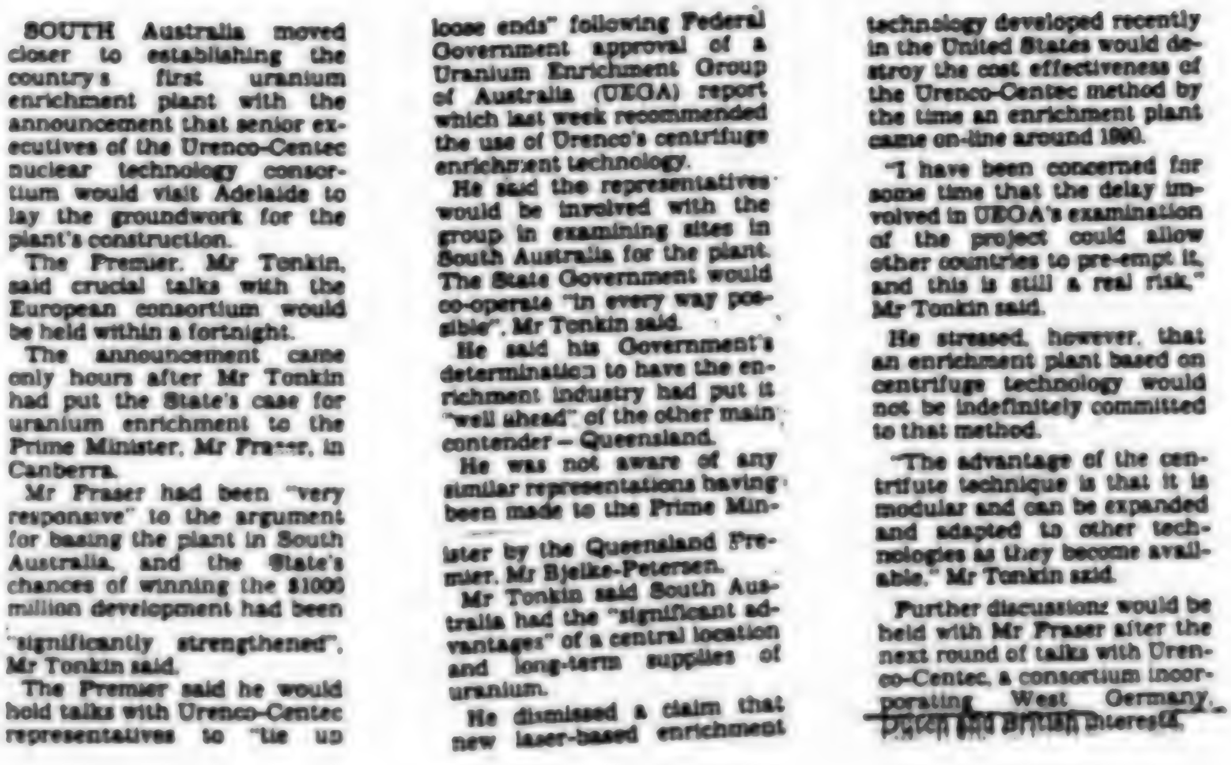
CSO: 5100/7508

SOUTH MOVES AHEAD WITH STUDY ON URANIUM ENRICHMENT

Canberra THE AUSTRALIAN in English 12 Oct 82 p 32

[Article by John Stanton]

[Text]



SOUTH Australia moved closer to establishing the country's first uranium enrichment plant with the announcement that senior executives of the Urenco-Centec nuclear technology consortium would visit Adelaide to lay the groundwork for the plant's construction.

The Premier, Mr Tonkin, said crucial talks with the European consortium would be held within a fortnight.

The announcement came only hours after Mr Tonkin had put the State's case for uranium enrichment to the Prime Minister, Mr Fraser, in Canberra.

Mr Fraser had been "very responsive" to the argument for basing the plant in South Australia, and the State's chances of winning the $1000 million development had been "significantly strengthened", Mr Tonkin said.

The Premier said he would hold talks with Urenco-Centec representatives to "tie up loose ends" following Federal Government approval of a Uranium Enrichment Group of Australia (UEGA) report which last week recommended the use of Urenco's centrifuge enrichment technology.

He said the representatives would be involved with the group in examining sites in South Australia for the plant. The State Government would co-operate "in every way possible", Mr Tonkin said.

He said his Government's determination to have the enrichment industry had put it "well ahead" of the other main contender — Queensland.

He was not aware of any similar representations having been made to the Prime Minister by the Queensland Premier, Mr Bjelke-Petersen.

Mr Tonkin said South Australia had the "significant advantages" of a central location and long-term supplies of uranium.

He dismissed a claim that new laser-based enrichment technology developed recently in the United States would destroy the cost effectiveness of the Urenco-Centec method by the time an enrichment plant came on-line around 1990.

"I have been concerned for some time that the delay involved in UEGA's examination of the project could allow other countries to pre-empt it, and this is still a real risk," Mr Tonkin said.

He stressed, however, that an enrichment plant based on centrifuge technology would not be indefinitely committed to that method.

"The advantage of the centrifute technique is that it is modular and can be expanded and adapted to other technologies as they become available," Mr Tonkin said.

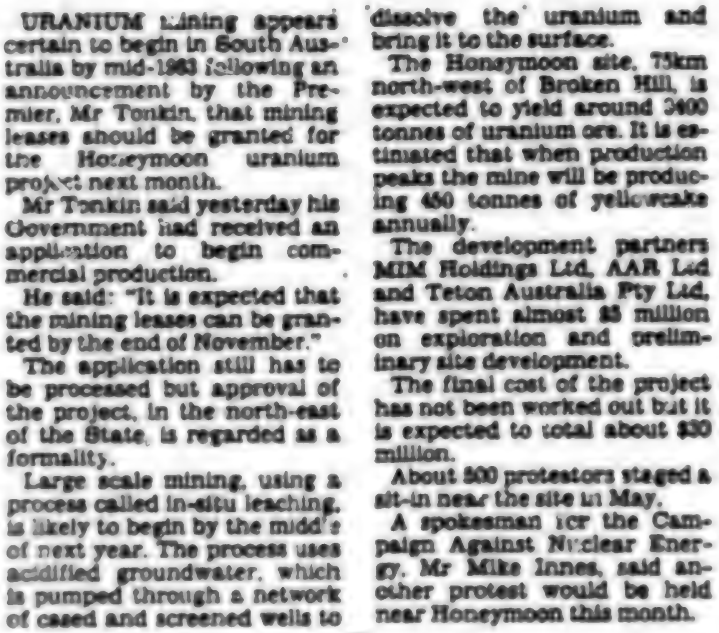
Further discussions would be held with Mr Fraser after the next round of talks with Urenco-Centec, a consortium incorporating West Germany, Dutch and British interests.

CSO: 5100/7508

SOUTH AUSTRALIA TO OK LEASES FOR HONEYMOON URANIUM MINE

Canberra THE AUSTRALIAN in English 7 Oct 82 p 1

[Text]



URANIUM mining appears certain to begin in South Australia by mid-1983 following an announcement by the Premier, Mr Tonkin, that mining leases should be granted for the Honeymoon uranium project next month.

Mr Tonkin said yesterday his Government had received an application to begin commercial production.

He said: "It is expected that the mining leases can be granted by the end of November."

The application still has to be processed but approval of the project, in the north-east of the State, is regarded as a formality.

Large scale mining, using a process called in-situ leaching, is likely to begin by the middle of next year. The process uses acidified groundwater, which is pumped through a network of cased and screened wells to dissolve the uranium and bring it to the surface.

The Honeymoon site, 75km north-west of Broken Hill, is expected to yield around 3400 tonnes of uranium ore. It is estimated that when production peaks the mine will be producing 450 tonnes of yellowcake annually.

The development partners MIM Holdings Ltd, AAR Ltd and Teton Australia Pty Ltd, have spent almost $5 million on exploration and preliminary site development.

The final cost of the project has not been worked out but it is expected to total about $30 million.

About 500 protestors staged a sit-in near the site in May.

A spokesman for the Campaign Against Nuclear Energy, Mr Mike Innes, said another protest would be held near Honeymoon this month.

CSO: 5100/7509

REVIEW OF URANIUM MINING, MARKETING DEVELOPMENTS

Canberra THE AUSTRALIAN in English 7 Oct 82 p 15

[Article by Don Kirkwood]

[Text]

A VIGOROUS new marketing program by Australia's premier uranium miner, Energy Resources of Australia Ltd, may delay the start-up of the $800 million Jabiluka mine in the Northern Territory.

Jabiluka, which is owned 65 per cent by Pancontinental Mining Ltd and 35 per cent by the United States-owned Getty Petroleum group, received Federal Government approval to seek contracts and to go ahead with mine development in July.

Pancontinental and its partner will need to write sufficient contracts by the start of the 1983 dry season in March-April to cover at least a significant portion of the 3500 tonnes of uranium oxide a year they plan to produce.

Otherwise they will not be able to raise the finance needed to develop the mine.

Pancontinental is actively seeking markets in Europe, but while the company hopes to write enough contracts to start mine construction in 1983, as originally planned, it may not be able to do so.

"We have a good opportunity to get contracts together to be able to start construction next year," Pancontinental chairman, Mr A.J. Grey, said yesterday.

"But we just can't tell."

ERA's mine at Ranger, only about 25km south of Jabiluka, is producing at the rate of 3300 tonnes of uranium oxide a year, all covered by long-term contracts.

ERA ceased its marketing operations early in 1981 when it had received contracts covering more than 95 per cent of its initial output until 1996.

But three months ago it hired Mr Peter Braidwood, formerly of CRA Holdings Ltd, to activate a search for new markets.

This timing could not be more awkward for the Jabiluka partners.

The Ranger mine came on stream last October, and it has experienced scarcely a hiccup in working up to full output.

Established

Indeed, its profit of $36 million for the first nine months of operations (to June 30) shows just how efficient the operation is.

Ranger thus has a proven track record. It also has enormous reserves — they are stated at about 115,000 tonnes of contained uranium oxide, but are believed to be much larger — and it can easily, and inexpensively, lift output.

It has obtained "expressions of interest" in further long-term contracts from the US and Europe.

Mr Braidwood said further contracts could be obtained in "the next little while" and added: "Once the market turns we'll have ourselves in a great position.

"The attractions of ERA as a source of supply are greater than those of any other projected Australian mine, mostly because we are already an established producer."

ERA can lift capacity to 4100 tonnes of uranium oxide a year simply by removing bottlenecks from its present plant.

The cost of doing so is so low the company has not even bothered to calculate it.

More worrying, at least from the Jabiluka partners' point of view, is that Ranger's output can be boosted from 3300 tonnes to 6600 tonnes a year at a maximum cost of $60 million.

In other words, Ranger can lift its capacity by almost the entire $800 million first-stage capacity of Jabiluka for a tenth of the cost.

It could also do so in less than half the estimated three and a half years that it will take to construct the Jabiluka mine and mill.

It is also having to cope with the output of another large new mine coming on stream at Key Lake, Canada.

Australia's uranium producers have to satisfy the Federal Government as to a floor price, believed to be about $30 a lb of uranium oxide.

The Canadian producers operate under no such constraint.

CSO: 5100/7509

CLEAN-UP PROCEDURE AT MARY KATHLEEN URANIUM MINE DISCUSSED

Melbourne THE AGE in English 9 Oct 82 p 13

[Article by David Uren]

[Text]

The manager of the Mary Kathleen uranium mine, Terry Ward, has a party trick. He cups his hand under the outlet of a bore, sunk to catch liquid seeping from the uranium tailings dam and takes a long drink.

"We don't glow in the dark, it is perfectly safe," he told journalists invited by the company to tour its operations. The Australian uranium industry has a lot vested in that assurance.

The last drum of uranium yellowcake is due to emerge from the treatment plant on Friday and the company has embarked upon a controversial course of rehabilitating the plant and the mine site.

The most dangerous part of a uranium mine is the tailings pond where sulphuric acid is stored after it has been used in the uranium treatment plant. The acid still contains about 12 per cent of the uranium, along with other dangerous elements.

After the Rum Jungle uranium mine was closed in 1971, leakages from the tailings dam killed all fish and other aquatic life in the East Finnis River for a distance of 10 kilometres. Pandanus palms lining the waterway died and reeds and water-lilies disappeared.

A letter from the chairman of the Federal Government's Uranium Advisory Council, Mr L. R. McIntyre, to the Trade and Resources Minister, Mr Anthony, two years ago said: "The council is concerned that another Rum Jungle situation should not occur at Mary Kathleen."

Mr McIntyre said there were operational problems at the mine, and he drew the Minister's attention to seepage from the tailings ponds, which he said the company was concerned about and was trying to contain. The engineers at Mary Kathleen now believe they can turn those problems to their advantage.

The usual procedure for uranium mine closures overseas is to neutralise the acid by pouring lime into the tailings pond. The liquid is then drained and the tailings left are covered with more lime and clay, to stop water getting in or poisonous radon gas from getting out.

Terry Ward and his advising engineers believe the rock and soil structure of the Mary Kathleen region enable them to deviate from the normal procedure. Instead of neutralising the liquid from the tailings pond with lime, which company officials say would have cost about $5 million, Mary Kathleen has dug some deep trenches and is simply pouring the poisonous liquid into the ground.

When seepage from the tailings pond was recognised as a problem several years ago, the company sank bores to pump the escaping liquid back into the pond. To the surprise of the engineers, they found the liquid was no longer acidic, having been neutralised by alkaline calcium carbonate soil.

Mr Ward said the underground streams of water pass through a single bottleneck and to allay the fears of farmers with bores further down the water table, the company will sink a bore at that point and pump the liquid out.

Mr Ward shrugged off suggestions that the pump would not be able to cope with the flood of water coming down in the wet season and used his party trick to try to demonstrate that the liquid would be safe for drinking in any case.

He says that just to be on the safe side, paths will be cut to prevent cattle from drinking the liquid, which will then be piped back to fill the site of the open cut mine.

In a second deviation from the normal procedure for rehabilitating a uranium mine site, MKU has decided against covering the tailings pond with clay. To get sufficient clay to cover the 87 hectares of tailings and evaporation ponds, the company would either have had to strip and then revegetate a large area of land in the region, or would have had to import the clay.

MKU will save several million dollars by using waste rock from the mining operation, which it has in abundance, instead of clay. Mr Ward says that a metre of crushed rock covering the dried tailings area will cut the radiation risk to an acceptable level. The company does not believe that rain water seeping through the rock to the old pond will cause any problems.

Mr Ward said the Queensland Government had accepted MKUs submission that rehabilitation procedures cannot be uniform for all uranium mines, and that companies should be able to make the best use of the materials available at their own mine sites.

The company hopes to complete its work at the mine by the end of 1985 and hand the mining lease back to the Queensland Government. Once the lease is returned, the company will be absolved of all responsibility for the area and any monitoring of radiation in the area will be up to the Queensland Government. The company will probably be put into voluntary liquidation and its capital returned to the shareholders.

CSO: 5100/7509

AUSTRALIA

JAPAN'S URANIUM NEEDS WILL GIVE AUSTRALIA HIGH PRIORITY

Melbourne THE AGE in English 15 Oct 82 p 20

[Article by Hamish McDonald]

[Text]

TOKYO, 14 October.— Japan hopes to participate in up to 10 new sources of uranium in Australia and elsewhere in the 1990s, according to a leading nuclear fuel official.

The resource director of Japan's State-owned Power Reactor and Nuclear Fuel Development Corp (Donen), Mr Koichi Hashimoto, says in a report that Donen is concentrating exploration activities in Australia, Canada and West Africa to assure future supplies.

He says Japan has secured uranium supplies until 1990 under contracts with Canada, Britain, South Africa and other countries totalling 160,000 short tons, plus an additional 35,000 tons from Australia's Ranger mine and from Niger in West Africa.

However, annual demand is projected at 12,000 tons in 1990, about 19,000 tons in 1995 and 21,000 tons in 2000. Demand will outstrip supply sometime in the early 1990s.

By 1995 Japan will need 15,000 tons a year from new sources and 20,000 tons a year by 2000, meaning that an additional 130,000 tons are needed by 2000, Mr Hashimoto says.

"Japan adopted a policy of securing some one third of uranium annually needed in the future by development imports with official - private co - operation, besides that acquired through long-term contracts, in order to secure a stable supply of uranium resources required by this nation," he says.

"In order to achieve this target a new uranium mine of 1000 tons a year scale must start producing sometime after 1990.

"By 1995, five to seven mines of the same scale and by 2000 eight to 10 mines of the scale should be developed and their uranium should satisfy demand in Japan in the form of development imports."

Mr Hashimoto says Donen's uranium discovery at Officer Basin in Western Australia had used unique methods confirming many abnormal uranium holes including a maximum assay equivalent to 1.6 per cent uranium oxide. The load is horizontal and extensive, 30 metres underground.

CSO: 5100/7509

GANDHI ANSWERS QUESTIONS ON NUCLEAR FUEL

New Delhi PATRIOT in English 22 Oct 82 p 1

[Text] **INDIA HAS BEEN UNDER TREMENDOUS INTERNATIONAL PRESSURES ON THE ISSUE OF SUPPLY OF NUCLEAR FUEL FOR THE TARAPORE POWER PLANT, PRIME MINISTER INDIRA GANDHI TOLD THE RAJYA SABHA ON THURSDAY.**

The country, she said, had been able to withstand the international pressures all through. "We shall continue to do so", she declared.

Pressed for details by Mr K C Pant and other members, the Prime Minister maintained that it would not be good to discuss the subject at a stage when negotiations for the resumption of fuel supply were in progress.

India had made its position clear to the world on it. "I can assure the House that Government is well aware of the national interests", she said.

Regarding termination of the 1963 agreement with the United States on supply of nuclear fuel for Tarapur, Mrs Gandhi said the agreement was a document for a particular period and it would expire after its term was over.

Mrs Gandhi said there was no question of cancellation of the agreement.

Answering the main question, Mr C P N Singh, Minister of State for Science and Technology said that the Rajasthan Atomic Plant number (RAPP) I and II were functioning fairly satisfactorily.

After a number of supplementaries and shouting by some Opposition members, Mr Singh said the average performance of RAPP was seven per cent of its installed capacity.

The Government was looking into various problems facing the RAPP and the Parasad committee which had gone into the matter had submitted its report which was being implemented.

During the current year, unit-I of RAPP had been shutdown since 4 March, 1982 to attend to the recurrence of a leak in one of the end shields. Unit-II had been shutdown from 20 January, 1982 to June 26, 1982 to attend to capital maintenance jobs including repair of the turbine blades and replacement of the shutdown.

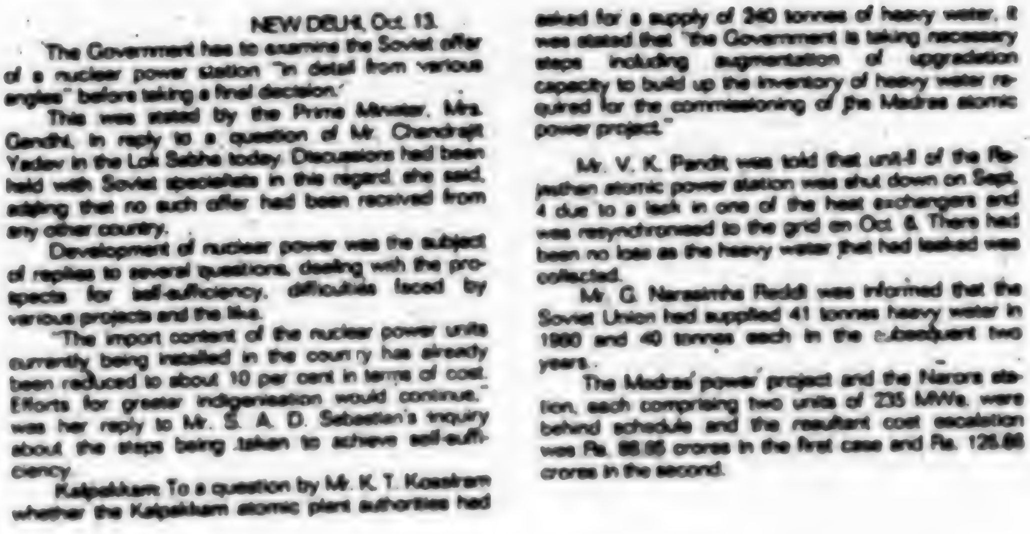
Unit-II was again shutdown from 4 September to 6 October, 1982 to repair leaks in another heat exchanger.

CSO: 5100/7018

GANDHI: SOVIET NUCLEAR PLANT OFFER TO BE STUDIED

Madras THE HINDU in English 14 Oct 82 p 6

[Text]



NEW DELHI, Oct. 13.

"The Government has to examine the Soviet offer of a nuclear power station "in detail from various angles" before taking a final decision."

This was stated by the Prime Minister, Mrs. Gandhi, in reply to a question of Mr. Chandrajit Yadav in the Lok Sabha today. Discussions had been held with Soviet specialists in this regard, she said, adding that no such offer had been received from any other country.

Development of nuclear power was the subject of replies to several questions, dealing with the prospects for self-sufficiency, difficulties faced by various projects and the like.

"The import content of the nuclear power units currently being installed in the country has already been reduced to about 10 per cent in terms of cost. Efforts for greater indigenisation would continue," was her reply to Mr. S. A. D. Sebastian's inquiry about the steps being taken to achieve self-sufficiency.

Kalpakkam: To a question by Mr. K. T. Kosalram whether the Kalpakkam atomic plant authorities had asked for a supply of 240 tonnes of heavy water, it was stated that "the Government is taking necessary steps including augmentation of upgradation capacity to build up the inventory of heavy water required for the commissioning of the Madras atomic power project."

Mr. V. K. Pandit was told that unit-II of the Rajasthan atomic power station was shut down on Sept. 4 due to a leak in one of the heat exchangers and was resynchronised to the grid on Oct. 6. There had been no loss as the heavy water that had leaked was collected.

Mr. G. Narasimha Reddi was informed that the Soviet Union had supplied 41 tonnes heavy water in 1980 and 40 tonnes each in the subsequent two years.

The Madras power project and the Narora station, each comprising two units of 235 MWe, were behind schedule and the resultant cost escalation was Rs. 88.85 crores in the first case and Rs. 126.88 crores in the second.

CSO: 5100/7013

AEC CHAIRMAN DISCUSSES NUCLEAR ENERGY PROGRAM

Madras THE HINDU in English 23 Oct 82 p 8

[Text] VISAKHAPATNAM, Oct 22.

India had embarked on a massive nuclear energy programme to produce 10,000 MW of power by the end of this century, the chairman of the Atomic Energy Commission, Mr. H. N. Sethna, said here today, while delivering the convocation address at Andhra University. It envisaged a three-stage programme to achieve this, he said.

The first stage would be based on power production by thermal reactors using Pressurised Heavy Water Reactors (PHWRs). Natural uranium resources identified in India indicated that a natural uranium reactor programme of 6,000 to 8,000 MW could be sustained.

Substantial reserves: More recently, exploration had shown the likely existence of substantial quantities of recoverable uranium resources in new locations. Therefore, it may be possible to undertake a much larger thermal reactor programme.

According to Mr. Sethna, the total installed nuclear capacity at present was 860 MW — 420 MW from the Tarapur Atomic Power Station and 440 MW from the Rajasthan Atomic Power Station. Two other power stations were under construction. They were the 470 MW Madras Atomic Power Project at Kalpakkam which was nearing completion and the 470 MW Narora Atomic Power Station at Narora in Uttar Pradesh. He said work had also been initiated on another atomic power station of 470 MW capacity at Kakrapar in Gujarat.

The second stage of the programme envisages the use of plutonium which is generated, reproduced and accumulated in the first stage, for starting fast breeder reactors wherein more plutonium from depleted uranium (of the first stage) or uranium-233 from thorium-232 is bred.

It is estimated that a 2,700 MW installed capacity of PHWRs, working at 75 per cent load factor can produce 900 kg. of plutonium every year. This will be sufficient to support a programme of one new 400 to 500 MW fast breeder reactor every alternate year.

Use of plutonium: The third stage, Mr. Sethna said, would consist essentially of the utilisation of plutonium produced in the second stage for making more fast breeder reactors. Uranium-233, produced in the second stage, was proposed to be used for constructing breeders. Additionally, advanced thermal converter reactors based on uranium-233 and thorium-23 were proposed to be constructed. More plutonium and uranium-233 could thus be produced for further recycling into fast breeders.

It was planned ultimately to achieve a self-multiplying power generation system essentially based on uranium-233 and thorium-232 thermal and fast breeder cycles.

Mr. Sethna said India's indicated and inferred reserves of uranium amounted to about 67,000 tonnes of U_3O_8. This was in addition to about 10,000 tonnes of U_3O_8 and 3.63 lakh tonnes of TH O_2 contained in monazitic sands along beaches and inland placer deposits.

"If we want to aim at a long-range nuclear power programme, our system should shift as early as possible to uranium-233 and thorium-232 base," Mr. Sethna said.

Early start: In view of the important role that fast breeders would play in meeting future requirements of energy, Mr. Sethna said India had recognised the advantage of an early start in this direction.

In order to fully develop fast breeder reactor technology, a Reaction Research Centre (RRC) had been set up at Kalpakkam with facilities for material research, radio-chemistry, radio-metallurgy and fuel reprocessing, besides a fast breeder test reactor which was in an advanced stage of construction.

Depends on first stage: The success of the fast breeder programme or, for that matter the entire nuclear energy programme, would essentially depend on the extent of success achieved in running first generation nuclear plants and extracting plutonium for use in fast breeder reactors, he said.

CSO: 5100/7019

AEC CHAIRMAN TALKS TO NEWSMEN IN RAJKOT

Madras THE HINDU in English 4 Oct 82 p 6

[Text] RAJKOT, Oct. 3--The chairman of the Atomic Energy Commission, Mr. H. H. N. Sethna, told newsmen here yesterday that Pakistan neither had the industrial infrastructure necessary for producing an atom bomb, nor had the "resources and capable brains" for the purpose. He however, said that his was a minority view.

He was referring to the view of the American defence analyst, Prof. Stephen Cohen that Pakistan might use the nuclear weapon against India in the near future.

(Prof. Cohen has said the Pakistani military establishment feels that nuclear weapons in its hands will help it some time in the future to 'grab' Kashmir in one bold, swift move. Prof. Cohen expressed this view in a paper contributed to an Asian scholars conference in the US after visiting Pakistan and having discussions with senior army officers there.)

The world was too small for a nuclear war and there was nothing like a "limited" nuclear war as feared by Prof. Cohen. Nuclear war, if at all came, would be the end of civilisation.

Giving details about Pakistan's nuclear programme, Mr. Sethna said for a nuclear warhead, Pakistan had no plutonium reactor and to produce enriched uranium-235 to weaponry standards, its resources were doubtful.

Replying to a question, he said India was behind schedule in heavy water production as "we started late on this project", but efforts were being made to cover the shortfall.

He said two nuclear reactors were almost in ready condition as "standby" to the Tarapur atomic power station which was facing fuel supply complications.

One of these reactors in Bombay was fully ready while the other one at Tarapur was progressing rapidly.

Referring to peaceful uses of nuclear research, Mr. Sethna said the country had already achieved a lot, but had a long way to go, to match the technology of advanced nations.

The only answer. A breakthrough in agriculture was the only answer to the country's problems, he said speaking on, "New horizons of science", at a function organised by the Saurashtra University Teachers' Association.

He called for strict discipline in the matter of production and uses of energy. It was essential to adopt a pattern which involved a mixture of advanced technology and one which put the manpower to maximum use.

He suggested the construction of a village road complex throughout the country and advocated the use of bullock carts for transporting agricultural produce to the nearest urban markets, against the present system of dieselised transport.

There was a tremendous scope for utilising wind energy throughout the country's coastline, he said, but regretted that very little research was being done on the subject.

About utilising solar energy, Mr. Sethna said though it was an abundant source of energy, ways were yet to be found to make it cheaper and economically viable.

CSO: 5100/7011

INDIA'S NUCLEAR PROGRAM DESCRIBED

Kuala Lumpur ASIAN DEFENCE JOURNAL in English Sep 82 pp 84-87

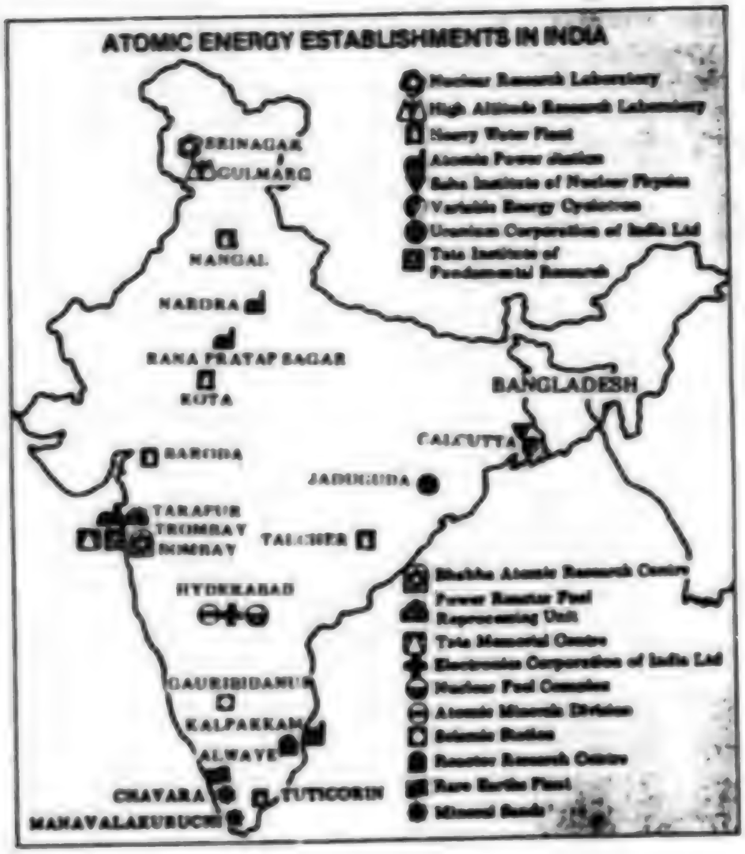
[Article by S. K. Ghosh, member, Institute for Defence Studies and Analysis, New Delhi]

[Text] India has emerged as a leader among developing countries in nuclear power generation and the peaceful utilisation of atomic energy. As a matter of fact, India is well on its way to an independent capability to design, build and operate nuclear power plants and associated industrial facilities like factories for the manufacture of reactors, nuclear fuel materials and fabricated nuclear fuel. According to a U.S. Senate Foreign Relations Committee report, released in April 1982, when its current nuclear power plants programme is implemented, India will have more (nuclear) power than Argentina, Brazil or Yugoslavia although less than South Korea, Taiwan and South Africa.

India's long-term strategy for nuclear power generation, as originally planned by Dr. Homi Bhaba, the first Chairman of the Indian Atomic Energy Commission, and seconded by Dr. Sarabhai, Dr. Bhaba's successor, consists of three stages. In the first stage to be built are the natural uranium fuelled and heavy water moderated and cooled reactors of the Canadian CANDU type — like the ones at Kota in Rajasthan, Kalpakkam in Tamil nadu and Narora in Uttar Pradesh, or like the fifth station to be constructed at Moticher (Kakrapar) in Gujarat. Natural uranium burnt in these reactors yields plutonium, which is being stockpiled for the second stage, in which plutonium (Pu-239) fuelled fast breeder reactors will be built. The core of these fast reactors will be covered by a blanket of Thorium which, under the intense radioactivity emanating from the core, will get converted into Uranium 233, another fissile material like plutonium. In the third and last stage, presumably around the turn of the century, Indian nuclear scientists and engineers hope to build commercial-scale fast breeder reactors, having U-233 as their core. This will eventually lead to a thorium uranium fuel cycle in the next century.

India's interest in the thorium fuel cycle stems from the fact that its thorium reserves are among the largest in the world - 319,000 tonnes out of the world total reserves of 1,073,000 tonnes. According to Dr. Raja Ramanna, Director-General of the Bhaba Atomic Research Centre (BARC), "while India's existing reserves of uranium could last only 20 years, there are vast deposits of thorium in the country which could be utilised as basic fuel in fast reactors producing nuclear power for the next 2,000 years".

Further, according to an assessment of the International Fuel Cycle Evaluation (INFCE), the fissile material content of cumulative spent fuel in India would be 3.45 tonnes in 1985 and 36.49 tonnes by 2,000 AD. India is, therefore, concentrating on the expansion of fuel reprocessing facilities. It has two spent fuel



reprocessing plants already working - one at BARC (Trombay) and the other at Tarapur. India also plans to build additional reprocessing plants with capacities of 100-200 tonnes a year as and when they are needed.

It will be relevant as well as interesting here to give a description of the sprawling nuclear installations in India (The accompanying map at above gives the location of each Unit). The details of the installations will reveal the wide scope and dimension of the Indian nuclear programme.

Bhaba Atomic Research Centre (BARC)

The BARC was set up as the Atomic Energy Establishment in 1957, and renamed BARC in 1967, after the name of the illustrious first Chairman of the Atomic Energy Commission, who died in an air-crash in 1966. It is the national centre for research and development work in nuclear energy and related disciplines. Its facilities include four research reactors, namely CIRUS (40 MW), APSARA (1 MW), ZERLINA (Zero energy thermal reactor)., and PURNIMA (Zero energy fast reactor); a 5.5 Mev Van de Graaff accelerator; a H-400 computer; a BEGM-6 computer; and various special laboratories. A 100-MW thermal reactor (R-5), mainly intended for research purpose, is under construction. The BARC also has a uranium metal plant and a plutonium reprocessing plant. There is also a training programme for young engineers and physicists and other scientists conducted by the BARC. Qualified engineers and scientists from this training course are employed in the various units of the Department of Atomic Energy (DAE). The training programme provides a qualified manpower base in the form of scientists, engineers and technologists.

Reactor Research Centre (RRC), Kalpakkam

Situated at the west coast of Bay of Bengal, the RRC undertakes research and development (R&D) work in all aspects of Fast Breeder Reactor Technology. The most important facility in this centre will be the 40-MW Fast Breeder Test Reactor (FBTR), which is nearing completion. According to latest reports, the FBTR will be commissioned in 1983. According to Dr. H. N. Sethna, Chairman of the Atomic Energy Commission, the major components of the FBTR are fabricated indigenously and the feasibility of 500 MW fast breeder reactors is also being examined. The FBTR, which will incorporate maximum possible parameters of a large proto-type power reactor and around which a number of other laboratories and workshop have been or are being built, will provide experience in design, construction and operation of the plutonium-fuelled, sodium-cooled fast reactor. Other facilities completed or are being built in the sprawling RCC complex comprise:

1) Materials Science Laboratpry;

2) Radio-Chemistry Laboratory;

3) Radio-Metallurgy Laboratory;

4) Safety Research Laboratory;

5) Fuel Reprocessing Development Laboratory

Apart from rendering help in construction and operation of FBTR, the objectives of these laboratories are the development of an efficient fuel cycle, sodium technology, development of materials and other research and detailed studies in connection with fast reactor technology. In building the RRC, particularly the FBTR, India has secured the assistance and technical collaboration of France, one of the pioneer nations which has developed the fast breeder reactor technology to an advanced and operational stage. Engineers and physicists from the RRC have got first hand training in developmental as well as operational aspects at the French fast neutron research reactors like the Rapsodie, Harmonie and the Masurca. (Indian engineers and scientists were trained particularly on Rapsodie).

Power Projects Engineering Division (Bombay)

This division undertakes the design, construction, commissioning and operation of nuclear plants throughout India. It is presently running the Tarapur and Rajasthan Atomic Power Stations and constructing the Madras Atomic Power (MAPP) and the Narora Atomic Power Projects. The Moticher (Kakrapar) power plant in Gujarat will also come under its jurisdiction. This plant will have two natural uranium-fuelled and heavy water moderated reactors incorporating the standardised basic design features of the Narora reactors, suitably adapted to local conditions.

The Tarapur plant with two boiling water-type reactors (total output 420 MW), fuelled with 3 percent enriched uranium supplies electricity to part of Maharashtra and Gujarat. The Rajasthan Atomic Power Project (RAPP) at Rana Pratap Sagar of Rajasthan has two natural uranium-fuelled and heavy water moderated and cooled pressurised reactors with a total output of 440 MW. It supplies electricity to part of Rajasthan. The Madras Atomic Power Project (MAPP) at Kalpakkam has two pressurised heavy-water type 230-MW reactors, similar to the ones at RAPP. However, unlike Tarapur and RAPP, where foreign collaboration exists (for Tarapur the USA and for RAPP, Canada), there is no foreign collaboration or assistance in MAPP's construction and hence, it is free of international safeguards. The Narora Atomic Power Station, under construction in Uttar Pradesh, also consists of two reactors of 235 MW each. Two more units of 235 MW each will be eventually added to the Narora Atomic Power complex. There is also no foreign collaboration in the Narora station's construction, and hence it is also free of safeguards.

These apart, the Department of Atomic Energy (DAE) has sanctioned six more units during the Sixth Five-Year Plant (1980-85). Of the six units sanctioned sites for two reactors has already been selected at Moticher (Kakrapar) in Gujarat.

Nuclear Fuel Complex (Hyderabad)

The Nuclear Fuel Complex is designed to meet the fuel requirements of the nuclear power reactors. One of its major jobs is to make fuel bundles out of enriched uranium supplied by the USA for the Tarapur Plant. Its working has since been adversely affected on account of the late or non-arrival of enriched uranium from the U.S.A.

However, the complex is currently in the process of expansion at an estimated cost of Rs. 13.06 crores "from its present capacity to manufacture 100 tonnes of finished fuel per year to 210 tonnes of finished fuel per year to meet the requirements of the heavy water reactor programme", according to a statement by Prime Minister Mr. Indira Gandhi in the Parliament (Rajya Sabha).

The Heavy Water plants at Baroda (annual production capacity 67 tonnes) and Tuticorin (Tamilnadu) (67 tonnes) are currently in operation, while a substantial part of the plant at Kota (100 tonnes) has been commissioned - the plant was expected to be fully operational by early 1982. At Talcher (Orissa) testing of the heavy water plant is practically over and subject to availability of synthesis gas; the plant was to be in operation by early 1982. There is also a small plant (14 tonnes) at Nangal, which is operational.

The Minister of State for Defence, Mr. Shivraj Patil, told the Parliament (Lok Sabha) on 9th September 1981 that India would reach self-sufficiency with respect to heavy water in March, 82 with heavy water plants at Kota and Talcher (Orissa) coming into operation. The total annual production of heavy water then would be 300 tonnes. The Government also plans to set up heavy water plants in the next phase at Thal-Vaishet in Maharashtra and another at Manuguru in Andhra Pradesh.

The Atomic Minerals Division (headquarters at Hyderabad), with five regional headquarters in other parts of the country, is responsible for research and development activities pertaining to radiometric and geological surveys, exploration, prospecting and development of uranium, thorium and other atomic mineral resources needed for nuclear power programme.

Nuclear Research Laboratory (Srinagar) is devoted to applied research in nuclear and radiation physics.

The High Altitude Research Laboratory at Gulmarg, set up in 1963, provides facilities for high altitude research to all scientific institutions and universities in the country.

The Variable Energy Cyclotron, set up at Bidhannagar, Calcutta, by the BARC, is now operating on a limited basis. It is a national facility for advanced work in nuclear physics, nuclear chemistry, isotope production and radiation damage studies for reactor materials.

Gauribidanur Seismic Station

Located 80 Km. north of Bangalore, this station was set up towards the end of 1965 in collaboration with the U.K. Atomic Energy Authority. It helps in detection and identification of underground nuclear explosions besides facilitating seismic research.

Industrial Units (connected with D.A.E.):

The following industrial units are intimately connected with the Department of Atomic Energy:-

- The Indian Rare Earth Corporation Ltd.
- The Electronics Corporation of India - it was established as a spin-off of the BARC.
- The Uranium Corporation of India Ltd. (Jadugoda), Bihar : Founded in October, 1967, the corporation is responsible for mining and processing of uranium ore. At present, it is producing uranium concentrate from the ore mined at Jadugoda.

Allied Institutions:

There are some allied institutions which cooperate with the Department of Atomic Energy. These are:

- Tata Institute of Fundamental Research (Bombay);
- Tata Memorial Centre (Bombay); and
- The Saha Institute of Nuclear Physics (Calcutta).

However, India's atomic power programme has, of late, received setbacks from two quarters. First, consequent on the peaceful nuclear explosion of May 1974, Canada unilaterally abrogated its nuclear cooperation agreement with India in May 1976. This has ended over two decades of Indo-Canadian Collaboration in peaceful utilisation of nuclear energy and hampered the growth of Indian nuclear technology. As a result of this abrogation the two nuclear power projects in Rajasthan (RAPP-I and RAPP-II) suffered a lot on account of Canadian ban on nuclear material exports. However, the Canadian abrogation of nuclear cooperation treaty ultimately turned out to be a boon in disguise - it gave impetus to self-reliance, and many vital parts, which were previously imported from abroad, are now being manufactured indigenously. Nevertheless, the commissioning of the two RAPP power stations was considerably delayed.

Secondly, the American reluctance and abnormal delay in supplying the stipulated enriched uranium-(according to the 1963 Indo-US agreement on Tarapur the USA is to supply the required enriched uranium for the Tarapur Plant till the expiry of the pact in 1993, and India is barred from going to any other sources for the fuel) - has caused enormous difficulty in the operation of the Tarapur Plant and kept idle for a considerable period of time the Hyderabad Nuclear Fuel Complex. With the coming in of the Reagan Administration, the supply position of nuclear fuel for Tarapur has become even more difficult. The Reagan Administration insists on full-scope safeguards, that is, safeguards for all nuclear installations in India irrespective of American collaboration or not. This position is not acceptable to India, hence the delay in the supply of enriched uranium (3 per cent enriched). Not only that, the USA is reported to have delayed the supply of some vital spare parts, without whose replacement the Tarapur plant may become accident-prone.

There are two possible ways to get rid of the difficulty concerning the Tarapur plant - either to abrogate the 1963 pact with the USA and look for other foreign sources of supply of nuclear fuel, or to work for indigenous sources of alternate fuel. The Indian Government appears to have taken the second alternative. Prime Minister Mrs. Indira Gandhi said in the Indian Parliament (Rajya Sabha) on 3rd September, '81, the Tarapur plant would be kept working with alternative means "irrespective of further fuel supplies from the United States". Mrs. Gandhi pointed out that the manufacture of alternative fuel for Tarapur would not need redesigning the Hyderabad plant.

The alternative fuel would consist of a mixture of plutonium and uranium oxide. Plutonium, being a fissile element, would provide neutrons for splitting the uranium atoms. The plutonium would most probably come from the reprocessing of spent fuel for which two facilities are already operational - one at Trombay and the other at Tarapur.

On account of these difficulties, the present nuclear power generation capacity has remained at a meagre total of 800-900 megawatts (MW) instead of the expected total of 1,800 MW (the Sarabhai profile of the late-sixties set the target of eighties at 2,700 MW).

However, a sum of rupees 1051.04 crore has been set apart for nuclear programme during the Sixth Five Year Plan period (1980-85). This would provide additional nuclear power capacity of 690 MW. Besides, as pointed out earlier, work on six more reactors, each with 235 MW capacity, will start. When these reactors are completed, the nuclear power generation capacity is expected to rise to 3,210 MW. The DAE hopes to generate by the turn of the century 10,000 MW of nuclear power. It is no doubt a very tall order, considering the lack of fuel (enriched uranium) and of heavy water.

India's international relations in the atomic field is also wider. For the 24th year in succession since the inception of the International Atomic Energy Agency (IAEA), India was nominated in 1980 a member of the Agency's Board of Governors. Agreements of collaboration between India and various foreign countries on the peaceful uses of atomic energy were signed from time to time. Agreements signed with various countries which became effective during 1980-81 include Syria, Yugoslavia and

Indonesia. Earlier similar agreements were signed, with, among other countries, Egypt and Bangladesh. France's collaboration in the FBTR has already been mentioned. The Soviet Union also came to India's help in supplying heavy water for the Rajasthan Atomic Power Project, of course under the usual IAEA safeguards. With the other Super Power-the USA- a tussle has been going on over the supply of fuel for the Tarapur Plant, details of which have been given earlier.

Military Implications of the Programme

The U.S. Senate Foreign Relations Committee, in a report released in April 1982 (mentioned earlier), visualises that India will enter the 1990s with a capacity to produce an arsenal of nuclear weapons. It notes that India has already demonstrated its capability to design and make a nuclear explosive compact enough to fit into a drill hole for an underground test as early as in May 1974. The design of the nuclear explosive suggests a compactness and configuration close to that of a usable nuclear weapon.

The Senate Committee report is highly speculative and merely of academic interest, since the Indian Government has more than once declared its intention not to manufacture nuclear weapons. Way back in May 1974, when India carried out its first, and so far the only, underground nuclear explosion, India was listed by Western observers among the few countries immediately to join the nuclear weapons club. Since then over eight years have passed, but nothing has happened so far.

As a matter of fact, India has the unique distinction of being the only country in the world, which, despite its expertise in nuclear weapons technology and ability to produce the weapons, has abstained from doing so and has repeatedly declared its intention not to produce them. As late as September 1981, Prime Minister Mrs. Indira Gandhi reiterated that atomic energy in India was being used "only for peaceful purposes". In an interview with Japanese daily, *Ashahi Simbun's* chief of correspondent of Asia general bureau, in the same month (September, 1981), the Indian Prime Minister said if there was another war with Pakistan it was more likely to be fought with conventional weapons. Asked whether India would develop nuclear weapons in case Pakistan acquired them, Mrs. Gandhi said: "We are not dependent on what Pakistan does. We have to make our policy independently".

Asked whether there was some possibility of India conducting another peaceful nuclear explosion (PNE), the Prime Minister replied, "No, we don't know. If we feel it is necessary, and our scientists want this, then we will think about it".

However, India has not surrendered its nuclear option, which means a future Indian Government, in any contingency, may take the decision to produce nuclear weapons.

As pointed out in the US Senate Foreign Relations Committee report, India's capability to produce compact and usable nuclear weapons has been demonstrated in the underground nuclear explosion conducted in May 1974. As for fissile material, it will have sufficient quantity in a few years' time from the unsafeguarded nuclear reactors of the MAPP and Narora. As for a workable delivery system, "the research involved in the development of (the four-stage solid-fuelled) SLV-3 closely parallels that of an ICBM". Indeed, the space booster technology involved in the lifting of heavy satellites and putting them in earth's orbit is essentially the same as that necessary for the development of long-range strategic ballistic missiles. But an effective delivery system also needs a very sophisticated guidance system for target accuracy as well as the development of re-entry heat shields (re-entry heat-shields are needed to prevent re-entry vehicles burning up due to friction in the atmosphere), which are not essential for merely lifting and putting a satellite in earth's orbit. Reports suggest that Indian space scientists have already taken up research and development work on these two counts, since sophisticated guidance systems and re-entry technology are also necessary for peaceful purposes-for bringing down satellite payloads to a pre-determined spot on earth for examination of data collected by the satellite.

As pointed out earlier, India has a growing technical manpower base in the form of scientists, engineers and technologists as well as a sound industrial base. In short as pointed by a nuclear physicist of the Indian Institute for Defence Studies and Analysis (IDSA), New Delhi, "India has the infrastructure for projecting a 'medium nuclear power' profile".

To conclude, since India has not surrendered its nuclear option, the sooner a beginning is made to utilise the spin-off benefits of nuclear and space technologies for purposes of defence the better. In any case, a greater coordination among the Department of Atomic Energy, the Indian Space Research Organisation (ISRO), the Electronics Commission and the Defence Research and Development Organisation is essential. At present, according to the IDSA nuclear physicist, this coordination has been "minimal". But the coordination should be maximum, since it will keep the nation ready and vigilant and will not put the country in a tight corner as and when the necessity for revising the nuclear option arises.

CSO: 5100/4306

INDIA REPORTEDLY SELF-RELIANT IN NUCLEAR FUEL

Bombay THE TIMES OF INDIA in English 21 Oct 82 p 1

[Text] New Delhi, October 20 (PTI).

India has achieved self-reliance in nuclear fuel for its power programme, the minister of state for science and technology, Mr. C. P. N. Singh, told Mr. M. Ramgopal Reddy in a written reply in the Lok Sabha today.

The Prime Minister, Mrs. Indira Gandhi, said that discussions were continuing with France for fuel supplies for Tarapur under the framework of the 1963 co-operation agreement and the safeguards agreement of 1971 which flows therefrom.

"Should India and France reach a mutually acceptable solution, India will continue to get necessary fuel supplies for the Tarapur atomic power station without any more obligations than those assumed under these agreements," the Prime Minister told Mr. Vijay Kumar Yadav in a written reply in the house.

Mrs. Gandhi said the development of MOX fuel for nuclear reactors was part of the country's overall research and development efforts.

She said it was not possible to segregate the expenditure incurred on it. The feasibility of using MOX fuel in light water reactors had been established, she said.

/Mr. C. P. N. Singh said that the existing proven resources of uranium in the country were considered adequate to meet the target of increasing the nuclear power capacity from the present 860 MW to 10,000 MW by the end of the century./ [in boldface]

The minister told Mr. Harinath Misra that provision had been made in the sixth plan and adequate provision would be made in future five-year plans as well for the construction initially of 235 MW reactor units of the Narora type to be scaled up later to 500 MW unit size.

Mr. Singh said that in addition to the 860 MW installed capacity of the operating nuclear power station, the installed capacity of the power projects under construction would be 1410 MW.

The facilities to manufacture fuel and heavy water were being augmented as required. To enable indigenous industry to gear itself to the production of the various components required for this programme, a dialogue with the representatives of industry had also been initiated, he said.

Mr. Singh said the optimum production of heavy water at Kota and Talcher plants might be achieved within three years, if they start functioning as expected by the end of the current financial year.

CSO: 5100/7016

INDIA

NUCLEAR WASTE PLANT TO BE COMMISSIONED SOON

New Delhi PATRIOT in English 19 Oct 82 p 8

[Text]

BOMBAY, Oct. 18 (UNI).

THE radioactive waste immobilisation plant at Tarapur, now undergoing trials, is expected to be commissioned by this year-end, reports UNI.

According to an article in a special issue of 'Nuclear India' — the official organ of the Atomic Energy Department — the plant will use a semi-continuous pot process, involving calcinations, followed by melting in the processing vessel and subsequent casting of the glass in a storage container.

The objective is to safely isolate the high-level radioactive wastes generated in the nuclear fuel cycle from man's environment. The general practice in all countries is to store these wastes, in a liquid form in high-integrity stainless steel tanks in underground concrete vaults.

With the available technology, the article says, there are a number of designs available for such special storage tanks, fitted with cooling facilities and required instrumentation. Additional safety features with sufficient redundancy and facilities for transfer of wastes are also provided.

Instances of leakage have occurred — some minor and some major — but the system has proved to be basically safe and satisfactory provided strict quality control is maintained followed by surveillance.

Stressing the need to keep spare tanks in case of accident or unexpected tank failures, the article highlights the necessity to go on building adequate storage tanks as the volume of wastes increases. But this involves a large capital outlay as the cost of storage tanks with high standards of fabrication and safety measures is high.

Pointing out that liquid storage can at best be only a temporary measure, the article says its conversion into a suitable solid form as soon as practicable offers a distinct advantage in handling, transport, storage and ultimate disposal, and minimises the degree of surveillance and monitoring requirements.

The currently accepted management concept involves solidification of the wastes, their containerisation, dissipation of a significant fraction of decay heat in a controlled manner in an engineered containment and, finally, disposal in a repository located in deep geological media.

A consensus is developing that the entire waste isolation scheme should be viewed as a system with a number of barriers built in to prevent movement of radio nuclides from the repository to the human environment. The system components constituting the barriers would include the solid waste form, the package, the backfill and the host rock.

Each of these barriers is important in itself and efforts to maximise their effectiveness will always be a continuing activity, but the natural geological barrier is perhaps the most important component in isolation of radioactivity and should be able to prevent any accidental release due to unforeseen failures of other barriers the article says.

While sufficient expertise exists in the nuclear industry to handle radioactivity, high-temperature processing of highly radioactive streams impose severe demands on plant designs, it says.

Effort to develop an engineering process for solidification of the high-level wastes have so far been mostly restricted to obtain glass or ceramic products. A number of processes, developed in different countries, vary in several details but they essentially involve a process of evaporation and calcination of the waste with the glass flux additives added either before or after the calcination, followed by melting.

The cost of managing the wastes generated from reprocessing spent fuels would depend on many factors, the article points out. In India it would work out to about Rs 720 per kg of heavy metal reprocessed.

CSO: 5100/7015

FRENCH INITIATIVE AWAITED IN NUCLEAR IMPASSE

Talks with Guttman

Madras THE HINDU in English 15 Oct 82 p 9

[Article by G. K. Reddy]

[Text] NEW DELHI, Oct. 14.

The Secretary-General of the French Foreign Ministry, Mr. Francis Gutman, had a preliminary round of talks today with the Foreign Secretary, Mr. M. K. Rasgotra, on Indo-French relations.

The two reviewed the progress of the implementation of the decisions taken during the Prime Minister's visit to Paris in November last and also the preparations under way for the French President, Mr. Mitterrand's visit to India next months.

The talks will be concluded tomorrow when Mr. Gutman might raise the nuclear issue if he has come with some new ideas on the subject. The Indian view is that the ball is now in the French court and it is for the French Government to find a way out of the impasse created by its second thoughts on the safeguards question.

Meanwhile, the Government of India continues to strike an optimistic note that the controversy would be settled amicably well before Mr. Mitterrand's visit. But as yet there is no indication of any new formulation emerging from the French side that can fully comply with the Indian contention that all safeguards on Tarapur must end automatically in 1993 with the expiry of the 1963 agreement.

Differences narrowed: The talks that the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, had in Vienna last month with his French counterpart, Mr. Michel Pecqueur, narrowed down the differences, but did not establish any mutually acceptable common position on the issue of additional safeguards, especially the perpetuity clause.

The French Secretary-General was due to arrive in Delhi on October 7 for these talks, but the visit was postponed by a week to suit his convenience. The postponement led to speculation that he was taking more time to finalise a new formula on the fuel supply arrangement.

But it became known later that Mr. Gutman sought the postponement since the French Foreign Minister, Mr. Claude Cheysson, had gone with President Mitterrand, on his African visit. It is not customary in the French Foreign Ministry for both the Minister and the Secretary-General to be away from the country at the same time, since at least one of them is required to be present in Paris to deal with any urgent issue that might arise.

The French Defence Minister, Mr. Charles Hernu, who left yesterday after concluding his visit, had wide-ranging talks on the prospects for increased defence cooperation between India and France. But he came forward with no new proposals for selling any extra equipment other than what was already under consideration.

He did not also make any special suggestions for closer collaboration on a long-term basis in designing and developing new weapon systems as the British Defence Minister, Mr. John Nott, did during his recent visit to Delhi.

The French Government will probably come forward with new proposals for increased cooperation in the defence and economic spheres during Mr. Mitterrand's visit. But unless the nuclear hurdles are removed in time, the Mitterrand visit could run into rough weather since India feels very strongly about the French attempts to impose stiffer safeguards contrary to the earlier understanding that the fuel will be supplied within the framework of the 1963 Indo-U.S. agreement.

Little Progress Reported

Madras THE HINDU in English 16 Oct 82 p 9

[Article by G. K. Reddy]

[Text] New Delhi, Oct. 15.

The Indo-French talks ended today without much progress on the nuclear issue other than providing a further opportunity to air their views on the persisting differences.

The fact that the Chairman of the Atomic Energy Commission, Mr. H. N. Sethna, who was in Delhi to be available for consultations, did not participate in these talks indicated that nothing new had emerged from the two-day discussions.

The talks concluded today in the sense that the Secretary-General of the French Foreign Ministry, Mr. Francis Guttman, was leaving for Srinagar tomorrow morning on a day's trip to Kashmir before returning to France. The Foreign Secretary, Mr. M. K. Rasgotra, was also due to go tomorrow to Wellington in the Nilgiris to address the Defence Services Staff College.

It was, therefore, decided that the two sides would continue the nuclear negotiations through diplomatic channels on the basis of the new approaches reportedly spelt out today by Mr. Guttman, while restating the French position on the safeguards question. The Government of India wants to get this issue out of the way as early as possible, within the next three or four weeks, before the President, Mr. Mitterrand's visit.

The Indian and French officials were maintaining strict silence on what exactly transpired at today's discussions, to avoid adverse publicity to the continued absence of an accord on the safeguards issue. The spokesman of the External Affairs Ministry declined even to confirm or deny whether the subject had figured at today's discussions.

CSO: 5100/7014

FAST BREEDER REACTOR TO BE PLACED IN SERVICE

Kuala Lumpur BUSINESS TIMES in English 21 Sep 82 p 17

[Article by Dilip Ganguly in New Delhi]

[Text] INDIA'S first plutonium-based fast breeder reactor will go on stream soon heralding the second phase of the nation's quest for nuclear power.

Atomic energy officials said the 15 megawatt (MW) fast breeder reactor (FBR) at Kalpakkam, near Madras in south India, was almost ready and its success will enable the scientists to chalk out a definite plan for the second phase.

If everything goes vell, India will set up everal small FBRs with giant 500 MW plant by he turn of the century.

In the first phase of ndia's nuclear energy rogramme that began in 1968 with the decision to set up the Tarapur plant near the west coast city of Bombay, the emphasis was on heavy water reactors. Tarapur was fuelled by enriched and natural uranium obtained from the United States and indigenous sources supplied by other plants.

The natural uranium obtained from Jadugoda mines of the Uranium Corporation of India in the eastern Bihar state and converted into fuel elements at the nuclear fuel complex at Hyderabad in the southern Andhra Pradesh state produced electricity and the plutonium as a by-product.

The fast breeder reactor will also produce more plutonium as uranium 233 from thorium placed in the blanket, the scientists said.

India has one of the largest thorium reserves in the world on a par with the United States at about 220,000 tonnes each.

Brazil and Canada come second with 160,000 tonnes each.

This puts India in a tremendous advantage in going ahead with the FBRs, the scientists said.

The breeder reactor will not only power the plant but also create more fuel to recharge itself and for a start-up charge for similar reactors.

It will provide much cheaper power than the present nuclear energy plants or those run on fossile fuels such as coal, oil or natural gas which are in short supply or being fast depleted.

The scientists said they will also be inherently safer than that the existing nuclear power plants and kinder to the environment.

While the United States, Britain and France have been concentrating upon the use of uranium 238 as breeder material because of the plentiful supply of uranium available to those countries, Indian scientists have concentrated on the production of uranium 233 as fissible material from thorium because of India's abundant reserves of that mineral, the scientists said.

The breeder reactors can also convert thorium to uranium 233 which is as good as uranium 235 as a fissile material and can be used in nuclear power plants, they added.

As part of its second phase nuclear programme, Dr H.N. Sethna, chairman of the Atomic Energy Commission, laid the foundation stone for a new thorium-processing plant at Thrombay, a suburb of Bombay, last March. The plant will produce 300 tonnes of thorium compounds annually when it starts operation in 1984.

At present only three per cent of the electricity produced in the country is from nuclear power, and the planners' original target of 8,000 MW of power by the beginning of the 1980s has not been achieved.

The actual figure is a mere 400 MW, much of it from Tarapur and the rest from the Canadian-built natural uranium-fuelled heavy water-moderated reactor at Rana Pratap Sagar in the state of Rajasthan. — AFP

CSO: 5100/8101

BRIEFS

KOTA NUCLEAR PLANT--KOTA, September 30 (PTI)--A COOLANT channel of the first unit of the Rajasthan atomic power plant has been removed following the detection of a pinhole leak. The power plant has been shut down for over a year. A spokesman of RAPP said that preliminary inspection of the main defect has been completed and the unit will begin operation in a "couple of months." The second unit which was closed down on September 4 and was expected to be started today will now start functioning from October 4, the spokesman said. [Bombay THE TIMES OF INDIA in English 1 Oct 82 p 5]

GANDHI ON TARAPUR--Prime Minister Indira Gandhi said on Wednesday that stocks of nuclear fuel at Tarapur atomic power plant was fast running out and no further consignment was expected from the United States, reports PTI. However, the Government would ensure continued operation of the plant, she said in the Lok Sabha in a written reply to Mohd Asrar Ahmed. She declined to spell out the details of future plans for running the plant saying it would be premature to do so. Operations in the enriched uranium sections of the nuclear fuel complex of the Department of Atomic Energy in Hyderabad have been suspended from the second week of September due to the non-receipt of supplies of enriched uranium, Mrs Gandhi said in a written reply to Mr Dava Ram Shakya. There would be no alternative but to close down the enriched uranium sections of the complex in the event of non-receipt of further supplies, she said. [New Delhi PATRIOT in English 7 Oct 82 p 5]

MIXED OXIDE FUEL--Bombay, 30 Oct--Dr. Raja Ramanna, Director, Bhabha Atomic Research Centre (BARC), said here today that the centre had developed mixed oxide fuel (MOX) and this was at the disposal of the Government. He was speaking at the Founder's Day function on the occasion of the silver jubilee of BARC. A centre to work on new types of accelerators and fusion was proposed. The reprocessing plant at Trombay would also go into production early next year. It was indeed remarkable that over the last 25 years, BARC had maintained the reputation of being one of the finest laboratories in the country, if not in the world, he said. Tributes were paid to the late Homi Bhabha by Dr. A. R. Gopala Iyengar, Mr. J. J. Bhabha (brother of Homi Bhabha), Mr. N. K. Prasad, Mr. B. V. Srikantan and Mr. J. Shankar. Medallions were presented to the speakers at the function. [Text] [Madras THE HINDU in English 31 Oct 82 p 1]

THAL-VAISHET HEAVY WATER UNIT--New Delhi, October 20 (PTI): Two new heavy water plants are being set up at Thal-Vaishet, Maharashtra, and Manuguru, Andhra Pradesh, the Lok Sabha was informed today. The installed capacity of the Rs. 187.65-crores Thal-Vaishet plant would be 140 tonnes and that of the Rs. 421.60-corres Manuguru plant would be 200 tonnes. The Thal-Vaishet plant was expected to be completed in 1987 and that of Manuguru in 1988. The minister of state for science and technology, Mr. C. P. N. Singh, told Mr. G. Narsimha Reddy in a written reply that the financial sanction for the projects had been issued and consultants appointed. [Text] [Bombay THE TIMES OF INDIA in English 21 Oct 82 p 9]

CSO: 5100/7017

CONSTRUCTION OF ATR PROVEN REACTOR TO BE UNDERTAKEN

Tokyo TOKI NO KEIZAI in Japanese 1 Sep 82 pp 30-35

[Article: "The Future of the Electric Power Development Co Ltd Which Became the Core for the ATR Construction"]

[Text] Although it has been decided that the EPDC (Electric Power Development Co) is to undertake the construction of the ATR (advanced thermal converter reactor) proven reactor, there are a mountain of problems related to this construction project that need to be solved. Therefore, the EPDC is not honestly happy about it.

As Different Pigeon From Pheasant

When it was decided that the construction of the ATR proven reactor would be undertaken by the EPDC, President Yoshihiro Ryokaku said: "We thought we were shooting for a pheasant, but a pigeon came down."

The EPDC dreamed for many years of advancing into nuclear power generation. It was aiming at introducing Canada's heavy water reactor (CANDU). Its dream of many years is to be realized in the ATR (a pigeon) for the present, and not in the CANDU (a pheasant).

The company is not happy even though its dream of many years can now be realized, because there is so much difference between a "pigeon" and a "pheasant" from the viewpoint of game. How is this pigeon to be cooked, or in the first place will the pigeon be cooked at all? The EPDC's outlook is full of difficulties.

There are a number of specific problems: 1) Who is going to pay the construction cost of the ATR proven reactor (approximately 120 billion yen) which is much higher than that of a light water reactor? 2) Who is going to buy the more expensive electricity once the ATR proven reactor (600,000 kW) is built? 3) A large sum of money will be needed to establish a nuclear fuel cycle for the ATR proven reactor consisting of a nuclear fuel reprocessing plant, a uranium enrishment plant, and a waste material treatment plant. 4) As to the construction site for the ATR proven reactor, the most likely place for the moment remains a site at Omacho, Shinokita-gun, Aomori Prefecture, which attracted the EPDC's nuclear energy construction project. However, the attraction was originally based on the premise of constructing a CANDU reactor, so it is uncertain whether the attraction still exists for the construction of an ATR proven reactor. 5) Assuming that an ATR proven reactor is to be constructed at Omacho, then what happens to the CANDU reactor which the EPDC had sought so tenaciously? These problems concerning the construction of the ATR proven reactor come to mind upon a brief reflection of the matter. Moreover, every one of these problems is an urgent problem.

Now then, why is the EPDC going to construct an ATR proven reactor which is laden with so many problems in spite of the danger that it may never be realized? To understand this, we must review the history of the EPDC, which has just celebrated its 30th anniversary, with its many turns and twists. In a few words, the "fate" imposed on it to play a complementary role to the nine electric power companies has followed it even when it is making an advance into the nuclear power era.

The EPDC was established in September 1952 in accordance with electric power development policy. Since then, the EPDC has ambitiously undertaken the development of large scale domestic hydroelectric power and construction work at almost all advantageous development sites. It has also undertaken the construction of a mine-site coal-firing thermoelectric power plant in line with domestic coal policy.

In 1960, the electric power development promotion law was revised and nuclear power was incorporated into the articles of the EPDC's business objectives. Nuclear power development was tackled in earnest only after 1968, when the nuclear power office was established within the EPDC. This nuclear power office carried out studies of the CANDU reactor and an advanced gas-cooled reactor (AGR) of Great Britain. The CANDU reactor was studied with the premise of introducing it to Japan. The EPDC was first among Japan's electric power circles to undertake research into nuclear power generation around 1954, soon after it was established.

The EPDC has thus aggressively engaged in the development of electric power by taking the lead in the Japanese electric power situation. However, the relationship between the EPDC and the nine electric power companies has not necessarily been congenial. The nine electric power companies were afraid of administrative intervention by MITI through the EPDC, because it, after all, was a company born of a national policy. The nine electric companies took an attitude of "rejection" toward the EPDC from the time of its inception. This rejection was expressed frankly when the nine electric power companies competed with the EPDC on matters concerning the introduction of the CANDU reactor.

It Used To Be Pioneer of Nuclear Power Generation

To the EPDC, which is the pioneer of nuclear power generation in Japan to enter into the nuclear power era is to attain its earnest wish. However, the nine electric power companies have felt uneasy about the EPDC's advance into nuclear power which is expected to become the mainstream of the future electric power, so they have maintained vigilance againt the EPDC throughout. However, in 1969 the nine electric power companies consented to the cooperation of the EPDC in constructing the ATR prototype "Fugen" which was undertaken by the Power Reactor and Nuclear Fuel Development Corporation (PRNF). The nine electric power companies were aware that they could not prevent the EPDC from entering the nuclear power field forever, but they did not want to compete with it in the field of nuclear power generation. In these circumstances, consenting to the EPDC's cooperation in the construction of the ATR "Fugen" was the most suitable thing to do as far as the nine electric power companies were concerned. By forcing the ATR upon the EPDC, the EPDC would be practically shut out of the light water reactor which is Japan's mainstream nuclear reactor.

In spite of the fact that the scheme of the nine electric power companies was so obvious, these nine were able to achieve their goal because it was the "fate" of the EPDC to play a complementary role to the nine companies.

However, there is no doubt that the EPDC has gained considerably from participating in the construction and operation of the "Fugen". Its technical know how concerning nuclear power generation must have been improved through this experience. Then the EPDC undertook on its own initiative the investigation and inspection of AGR and CANDU reactors, and announced in 1976 that it would introduce the CANDU reactor.

"In order to free Japan from its dependence on the United States on energy matters and to disperse the danger, it is necessary to introduce a 'natural uranium-heavy water reactor' as a strategic reactor type which is complementary to the 'enriched uranium-light water reactor'" was the reason given by the EPDC. This plan received the overall support of MITI.

On the other hand, the nine electric power companies objected at first to the EPDC's move arguing that "Japan's nuclear energy policy is to advance from the light water reactor to the fast breeder reactor (FBR), and the introduction of the CANDU will destroy this nuclear power policy." However, in 1978, they consented to the introduction of the CANDU reactor by the EPDC as a "proving reactor." The concept of a "proving reactor" is to persistently segregate the CANDU reactor from the electric power generating system by allowing the construction of a single unit for the purpose of ascertaining its economic feasibility and safety. An attempt to treat the EPDC's advance into the nuclear power field as an "exception" can be seen in this instance also.

For a while, it appeared as though the EPDC's deep attachment to the CANDU reactor might be realized. But the EPDC's dream of entering the nuclear power field through the CANDU reactor was crushed by a flat rejection in August 1979 by the atomic power commission: "There is not sufficient reason for introducing the CANDU reactor."

The atomic power commission's decision was no doubt strongly affected by the accident that occurred in March of the same year at the Three Mile Island nuclear power plant in the United States. Nevertheless, such a disappointing ending was very unsettling for the EPDC. Although the atomic power commission made its conclusion known, the plan to introduce the CANDU reactor did not basically change. The EPDC continued to carry out safety proving experiments and general technical investigation in preparation for the introduction of the CANDU reactor. Then came the decision to construct an ATR proven reactor.

Electric Power Companies Gain Confidence Through High Operating Rate

If we review briefly Japan's nuclear power generating system we will be able to understand the significance of the CANDU reactor and the ATR as well as the dilemma of the EPDC and the nine electric power companies.

The light water reactor is the mainstream of Japan's nuclear power and light water reactor nuclear power generation consists of a boiling water reactor (BWR) and a pressurized water reactor (PWR).

Originally, the light water reactor technology was imported from the United States, but numerous improvements in the light water reactor have been made by Japanese technology. As a result, the operating rate of Japan's nuclear power generators was better than 60 percent for 2 years in a row, in 1980 and 1981. An operating rate of 70 percent is considered the limit for the nuclear power generator, and an operating rate of 60 percent is considered to be almost full operation. Incidentally, the operating rates in foreign countries, except for an outstanding 68.1 percent for West Germany, are all under 60 percent; namely, 55.8 percent for the United States, 44.3 percent for Great Britain, and 58.1 percent for France, which is said to be most aggressive in developing nuclear power generation (these figures are for the 1981 calendar year).

This operating rate has extremely great significance economically, so much so that it may be directly connected to the argument concerning whether a nuclear power plant is needed. In this sense, each electric power company gained confidence through achieving the high operating rate. To Tokyo Electric Power, in particular, which owns one-third of Japan's total nuclear power generating capacity, it was a great confidence booster, because all its nucelar power reactors are of the BWR type, which is in the minority among the world's nuclear power reactor population, and it felt insecure. Now, the company is quite confident with its BWR line.

As a result, the light water reactor line is expected to become even more popular in the future, and the "medium and small light water reactor development and utilization system investigating committee" established in December last year by MITI can be construed to reflect this sentiment. However, this light water reactor uses uranium 235 enriched to about 3 percent concentration as the fuel, and a light water reactor of 1 million kW class will produce about 1 ton of plutonium a year. At present, the plutonium thus produced by the light water reactor is accumulating steadily without being utilized. How this plutonium stockpile is to be utilized will have an important impact on the nuclear power generating system, because the nuclear fuel cycle differs from one type of nuclear reactor to another. In order to utilize this plutonium as fuel again for the purpose of power generation, the uranium and plutonium contained in the waste nuclear fuel must be extracted. This calls for the reprocessing of the waste nuclear fuel. Reprocessing of the nuclear fuel is entrusted to Great Britain and France while the reprocessing plant is being built in Japan today. Based on the Tokai plant of the PRNF which is in operation today (design capacity 200 tons), there is a plan to build a reprocessing plant having an annual capacity of 1,200 tons in the 1990's.

As to the utilization of plutonium recovered from reprocessing, the favorite is the FBR which uses plutonium exclusively and produces more nuclear fuel than it consumes. However,the FBR is not expected to become a reality until around 2010, so the urgent problem at hand is how this plutonium ought to be utilized in the meantime.

How Plutonium Ought To Be Utilized

There are two ways of utilizing this plutonium. One way is to burn plutonium in the light water reactor (called plutonium thermal) and the other is to utilize it in an ATR. The electric power companies are inclined to push aggressively for the plutonium thermal.

Moreover, the nuclear power section of the general energy investigation commission has recently approved an interim report recognizing plutonium thermal. Based on this report, MITI is in the process of drafing a concrete system.

This interim report provides a blueprint for achieving regular utilization of plutonium in three steps. The first stage consists of a small-scale process experiment in which two to four of plutonium mixed oxide fuel rods will be used among 300-350 fuel assembly rods. Then, starting in the late 1980's, a proven reactor of practical scale in which plutonium fuel occupies one-third of the total fuel assembly will be tested for effectiveness. Finally, a practical application stage is to be reached in the mid 1990's.

Based on this, MITI has begun to step up preparations, in cooperation with the Science and Technology Agency (STA), for a small-scale proving experiment to be carried out at Mihama by the Kansai Electric Power and at Suruga by Nippon Nuclear Power. On the other hand, in regard to the management system, the electric business laws and the nuclear reactor regulations were revised to strengthen the protective measures so that the plutonium fuel cannot be removed from the plant. Moreover, in preparation for the practical application stage, the private sector must also be readied. Establishment of a new company in which the concerned enterprises such as the electric power companies would jointly invest is being investigated.

Thus, significant progress has been made toward the practical utilization of the plutonium thermal. However, technically speaking, "plutonium thermal is not very difficult technically; practical utilization of it can be realized with confidence by 1990" (according to Masatoshi Toyota, chief of Nuclear Power Development Headquarters, executive director of Tokoyo Electric Power).

However, the plutonium thermal has its share of problems. Due to the fact that plutonium may be used as a raw material for nuclear weapons, construction of a plutonium thermal must be approved internationally according to the nuclear nonproliferation treaty. Moreover, plutonium thermal is originally a technology developed by the United States, so U.S. consent is the premise for its application. Its use was practically stopped by a ban on the plutonium thermal issued by the Carter administration in 1979 in accordance with the nuclear nonproliferation treaty.

However, after the Carter administration was replaced by the Reagan administration MITI became somewhat optimistic about the matter: "The United States understands Japan's situation concerning the peaceful application of plutonium. A number of problems can be solved comprehensively through negotiation with the United States."

However, the viewpoint of the STA is quite the opposite: "The United States has been against the plutonium thermal consistently throughout the negotiations between the two countries on the reprocessing of plutonium. The U.S. stand cannot be expected to change."

MITI and the STA at one time opposed one another vehemently concerning the introduction of the CANDU reactor. Their viewpoints are again widely different concerning the possibility of the plutonium thermal. In regard to the introduction of the CANDU reactor, the STA insisted that "domestic technology ought to be free from using light water reactors," and it is also contemplating use of the ATR, a pseudo-domestic technology, for the utilization of plutonium.

In order to push forward the plutonium thermal, MITI is said to be hastening to make adjustments with the STA. However, it is doubtful at present that the adjustment will progress smoothly.

Economic Feasibility of ATR Has Many Problems

The ATR, Japan's first pseudo-domestic made reactor, was developed mainly by the PRNF as a national project beginning in 1967.

The ATR prototype "Fugen" (capacity 165,000 kW), which was constructed at Suruga, Fukui Prefecture, has been in regular operation since March 1979. The fact that the EPDC cooperated in the construction and operation of the "Fugen" was mentioned before.

Uranium 238 in the fuel absorbs neutrons and burns, and then changes into nuclear fission type plutonium 239. This process is commonly known as conversion. This conversion ratio is 0.5 in the light water reactor and as high as 0.8 in the ATR. That is how it got its name: advanced thermal converter reactor. Moreover, it is also called a heavy water reactor in contrast to the light water reactor, because it uses heavy water (specific weight 1.1), which does not absorb neutrons very well, as the moderator.

The CANDU reactor is also a type of heavy water reactor, and it uses natural uranium as fuel. In contrast, the ATR is quite versatile. It can burn used nuclear fuel, residue obtained after enrichment, degraded uranium, and plutonium singly or in combination as its fuel. The fact that the ATR can use plutonium as fuel drew attention in this era of plutonium utilization.

The atomic power commission, which recommends the ATR in a relief role until the FBR becomes practical, cites the following reasons: 1) It is a domestic technology. 2) It is easier to gain the understanding of the United States for it than for the plutonium thermal. 3) It is directly connected with the security assurance of the nuclear fuel cycle as part of the nuclear power complementary line. In regard to its questionable economic feasibility, an economic effect comparable to that of a coal thermal power plant is said to be achievable if about 10 ATR power plants are built.

On the other hand, the power companies are cool toward the ATR for the following reasons: 1) Its construction cost and the unit power cost are both higher than those of the light water reactor. 2) A considerable sum of money must be spent on the establishment of the nuclear fuel cycle, including a nuclear fuel reprocessing plant, uranium enrichment and waste material treatment. 3) They prefer the plutonium thermal and want basically to push for its development.

The economic feasibility of the ATR is the greatest drawback which concerns the power companies most. Because, once built, the power companies will be responsible for the power it generates. According to an estimate made by a special section of the atomic power commission, the unit construction cost based on operation starting in 1985 comes to 490,000-540,000 yen per kW, which is 1.7-1.9 times that of the light water reactor. Moreover, the unit electricity cost comes to 22-23 yen per RWH, which is considerably higher than the 11-12 yen per kWh for the light water reactor.

The construction cost of the ATR proven reactor, also estimated by the special section, is said to be as high as 296-322.5 billion yen for a unit having an output capacity of 600,000 kW. The cost can come down somewhat if it is mass produced, to the order of 190-230 billion yen if 10 units are built. This is still 10-30 percent more expensive than the light water reactor. The Suruga No 2 unit (pressurized light water reactor) being planned by Nippon Nuclear Power is estimated to cost about 370 billion yen for an output capacity of 1.16 million kW. Thus the ATR is at a disadvantage in every respect.

Nuclear Reactor Makers Are Also Negative

However, the ATR has the advantage of being able to use plutonium as fuel. Although the plutonium thermal has been banned by the U.S. nuclear nonproliferation policy, the ATR is a reactor uniquely Japanese, so nuclear proliferation can be prevented if the use of plutonium as fuel is approved. On the other hand, approval of the plutonium thermal for Japan as an "exception" and not for other countries will not go down well. However, approval of the ATR, which is uniquely Japanese, may go well as an exception.

The atomic power commission's assessment of the situration is correct on this point. However, there are problems even here. Whether it is the plutonium thermal or burning plutonium in the ATR, it is no more than a "link" between the FBR and the present. Because, when the FBR becomes practical, not only the plutonium thermal but also the ATR will become obsolete. Therefore, it is more advantageous to start work on the plutonium thermal than to construct the ATR.

According to a long-range plan drafted by the atomic power commission, the FBR is to become the mainstream of future nuclear power generation, and its practical application is expected to be realized around 2010. The prototype "Monju" will be brought to criticality around 1990, and the construction of a proven reactor will also begin at about the same time.

The experimental FBR "Joyo" (ultimate output 100,000 kW) reached criticality in April 1977. A go sign has been given to the construction of the "Monju" (electric power output 280,000 kW), and construction work is expected to begin next year.

However, no matter what one may say, the most outstanding FBR is France's "Super Phoenix." The FBR "Super Phoenix" proven reactor, which has its criticality targeted for 1984, is more of a commercial reactor according to its output (1.2 million kW). If the operation of this reactor can be carried out smoothly; there is no doubt that it will have profound impact on Japan's nuclear power strategy.

If for any reason, including delay in technology development and the economic factor, "the FBR is to be imported from abroad" as the light water reactor, was, then practical application of the FBR may be realized earlier than expected, and the situation of the ATR, which is to play a relief role, will be even more disadvantageous. Because a period of 10 years will be required to complete the construction of an ATR proven reactor, and there is no telling what might happen during that time.

Therefore, whether an ATR proven reactor will actually be constructed remains a question. The future of the EPDC, which is to undertake the construction of the ATR proven reactor, is full of difficulties.

This sentiment is reflected more clearly in the action taken by the Japanese plant makers.

When a go sign was given for the construction of the ATR proven reactor, Hitachi expressed its willingness "to positively tackle the task of commercializing the ATR." It appeared natural for Hitachi to be eager to construct the ATR proven reactor because it participated in the development of the ATR from the early days and it played the central role as the competent company in charge of overall coordination of the construction work on the "Fugen" carried out jointly by a number of companies.

However, Mitsubishi Heavy Industry and Toshiba are not expected to offer themselves as candidates for the position of competent company even though they will work in cooperation with Hitachi for the construction of the proven reactor under Hitachi's leadership. These three nuclear reactor makers used to compete furiously for the development and order of a light water reactor, so the situation concerning the ATR is conspicuously different. They figured that the number of plants to be built cannot be too great even if the commercial ATR becomes practical. Therefore, it will be better to put more effort into the FBR as a matter of policy.

No Problem Whatsoever Technically

The atomic power commission requested the cooperation of electric power circles in the construction of the ATR proven reactor starting this year. About this, the atomic power commission expresses its basic ideas as follows: 1) It would like to hear the recommendation of the private sector concerning the core undertaker. 2) The public and private sectors will bear an appropriate share of the cost. 3) The Plutonium thermal will be developed at the same time the ATR is being constructed.

Electric power circles expressed their opinion: "There are a number of problems concerning introduction of the ATR into the existing nuclear power generating system, so only one unit of 600,000 kW capacity should be constructed for the time being. Appointment of the EPDC as the core of undertaking this business seems appropriate." The EPDC was appointed to undertake the construction of the ATR as "recommended" by electric power circles, and that was the whole story.

The statement that "there are a number of problems concerning introduction of the ATR into the existing nuclear power generating system" was not only based on the idea that the plutonium thermal remained the main theme, but also on the concern that "although it is called a proven reactor, it is far too large in scale for a prototype." So, they agreed to cooperate in constructing just one unit. This situation is almost identical to that occasion in 1978 when electric power circles agreed to the introduction of a CANDU reactor in the form of a "proving reactor." Electric power circles opposed the introduction of the CANDU reactor at that time. However, they also realized that it was impossible to oppose it to the end, so they came up with the idea of a "proving reactor." They also conceived of a "proving reactor-like" proven reactor for the ATR proven reactor this time.

Even after agreeing to cooperate in the construction of the ATR proven reactor, electric power circles were on guard against matters concerning sharing of the construction cost: "The greater part of the proven reactor was originally part of a national policy" (says Gaishi Hiraiwa, president of the Electric Business Association). They expect the government's positive support. Of the total of approximately 300 billion yen of construction cost, electric power circles and the government will be responsible for about 30 percent each and the rest will be funded by a low-interest rate government fund -- this is what electric power circles desire.

On the other hand, President Tyokaku said: "The EPDC is honored to be placed in this position (by this appointment) in its 30-year history" when it was decided that the EPDC was to undertake the construction of the ATR proven reactor. On the other hand, he also said: "I have no particular impression, except to be deeply impressed by the importance of the responsibility to be appointed to undertake for the first time a project in the field of nuclear power. I will do my best to carry out this new task." To the EPDC, construction of an ATR proven reactor was something that fell from the sky, so there must be a number of impressions. Therefore, the expression "no particular impression" expresses on the contrary a complicated emotion.

However, there is no problem whatsoever as far as the capability of the EPDC for constructing an ATR proven reactor is concerned. The EPDC at present has a total of 200 technical personnel, including 60 in nuclear power development, 40 who went on leave to work with the PRNF, and 100 trained in nuclear power engineering. However, there is still a problem concerning how to handle the CANDU reactor. According to president Ryokaku: "The appointment to construct the ATR and its own CANDU reactor project are unrelated. It will continue to carry out a general investigation over a period of 2 years as usual," indicating clearly that there is no change in the basic policy. If so, the 200 technical personnel cannot all be assigned to the ATR construction project. It appears very difficult from the viewpoint of capital to put on a double feature show consisting of ATR and CANDU reactors both incurring enormous construction costs. In short, it is safe to assume that the CANDU reactor cannot be introduced easily, and there is no telling whether the project of constructing an ATR proven reactor may be discontinued due to unforeseeable circumstances over a period of more than 10 years, so it is laden with a mountain of difficulties. That is why the EPDC cannot sever its tie with the CANDU reactor completely. The EPDC undertook the introduction of the CANDU reactor because it considered "it should not do the same thing everybody else is doing," and now it is going to undertake the ATR proven reactor which does not belong to Japan's nuclear power generating system. Although this is the "fate" of the EPDC to be complementary to electric power circles, it is right to be satisfied in this role forever? The ATR project will be a "touchstone" of the EPDC's ability.

9113
CSO: 5100/4541

BRIEFS

IAEA EXPERTS VISIT--Three experts of the IAEA are visiting the country. Their visit is aimed at basically coordinating with the National Atomic Energy Commission (CNEA) the implementation of a regional project in this field. The visitors are Joseph A. Quartey, Kenneth Beswick and Ha Vinh Phouhg, Ghanaian, English and Vietnamese respectively. Yesterday they were received at the CNEA headquarters--which is under the Ministry of Industry and Energy--by national officials. [Excerpt] [PY112109 Montevideo EL DIA in Spanish 26 Oct 82 p 7]

CSO: 5100/2009

INVITATION FROM NIGER TO PARTICIPATE IN URANIUM EXPLORATION

Kaduna NEW NIGERIAN in English 25 Oct 82 p 7

[Article by Omoghene Onojake]

[Text]

NIGER Republic has invited Nigeria to participate in her exploration of uranium and to hold shares in her phosphate industry.

The Minister of Mines and Power, Alhaji Muhammadu Ibrahim Hassan, announced this when he and the Niger Republic Minister for Mines and Industry, Mr. Uomar Diallo, paid a courtesy call on the Governor of Plateau State Mr. Solomon Lar.

Alhaji Muhammadu said that the bond of economic and political friendship between the countries became strengthened in 1972 when Niger Republic entered into an agreement with Nigeria for the supply of 30 megawatts of Hydro Electric Power from Kainji Dam to Niger.

He revealed that Niger Republic had started bringing tin ore to Jos, Plateau State for smelting as an added impetus to the already existing economic relationship between the two countries.

The minister announced that his ministry, had through the Nigerian Mining Corporation, produced 7,030 tonnes of tin, 826,000 tonnes of stone aggregate, 21 million tonnes of bricks, 90,000 metric tonnes of marble and 1,190 tonnes of columbite.

Alhaji Muhammadu also announced that the ministry had planned to spend 1.9 million Naira for the reclamation of old mining pits in Plateau State, this year.

He disclosed that about 6,000 Naira had been expended by the Federal Government for the reclamation of such pits since 1980.

The figure showed that 325,000 Naira was spent to reclaim mining pits in Barkin-Ladi, 500,000 Naira for pits in Vom and environs and the notorious "killer pond" behind Saint Murumba College, Jos.

Alhaji Muhammadu commended the Plateau State Government for its co-operation with his ministry and urged the Plateau State Governor, Mr. Lar to continue in this spirit.

In his speech the visiting Niger Republic Minister for Mines and Industry, Mr. Uomar Diallo, said there had been economic, geographical and cultural link between Niger and Plateau State which he said would be enhanced by his visit.

He said that Niger Republic had gained much experience from tin mining in Jos and that it had been transferred to his country.

Governor Solomon Lar in response stressed that Niger and Nigeria had many things in common which he said had enhanced the good relationship existing between the two countries.

He thanked the Niger Republic Government for her kind gesture in inviting Nigeria to participate in her economic ventures.

Mr. Lar called on the Niger Republic Government to also participate in Nigeria's Oil Industry in order to strengthen the economic ties between the two nations.

The governor said the establishment of the phosphate industry in Niger Republic would lead to self-sufficiency in fertiliser production.

On the minister's entourage were the Niger Republic Ambassador to Nigeria, Alhaji Mohammed Awami, as well as senior officials of that country's Mines and Industry Ministry.

CSO: 5100/4

BRIEFS

NUCLEAR POTENTIAL--Lagos, 23 Oct--Nigeria has the potential to begin a nuclear energy programme, according to visiting Niger Minister of Mines and Industry, Oumar Diallo. Mr Diallo, quoted by the news agency NAN, told the governor of the northeastern state of Bauchi that this was the reason for his country signing a cooperation agreement with Nigeria for the exploration of uranium deposits in both countries. Nigeria supplies energy to Niger. (A.F.P.) [Text] [Paris AFRICA AFP in English No 2944, 26 Oct 82 p 9]

CSO: 5100/4

ESCOM RAPPED OVER NUCLEAR SAFETY PLAN

Johannesburg RAND DAILY MAIL in English 2 Nov 82 p 3

[Text]

CAPE TOWN. — The Medical Officer of Health in Cape Town, Dr R J Coogan, accused Escom yesterday of going back on its assurances that the city council would be involved in the drawing up of the Koeberg nuclear emergency plan.

In an "urgent" report to the amenities and health committee yesterday afternoon, Dr Coogan said Escom had not consulted the council's civil defence and health departments before its public briefing on the plan last month.

Dr Coogan said the Cape Divisional Council had "awesome responsibilities" for the immediate danger zone. He was "astonished" by the council's emergency plan to transfer up to 20 000 evacuees in City Tramway buses to the Cape Showgrounds in the city council's area.

"It was the first I had heard of it."

The amenities and health committee authorised Dr Coogan to seek urgent discussions with the Atomic Energy Board on the approval of the proposed safety plan for Koeberg prior to its imminent "coming-on-stream".

In his report Dr Coogan quoted from correspondence and the minutes of meetings between Escom and the council in 1980 in which Escom had assured the council it would play a big part in the emergency plan and was pleased with the council's interest.

There had been no formal involvement, however, Dr Coogan said.

Dr Coogan questioned Escom's statement in its publication "Living with Nuclear Energy" that no person had yet died from radiation, "not even at Three Mile Island".

Quoting Dr Gordon MacLeod, the Pennsylvania Secretary of Health at the time of the American nuclear accident, Dr Coogan said the neonatal mortality rate within a 10 km radius of Three Mile Island had jumped from 4,6 and 7,6 per 1 000 live births before the accident to 17,2 and 19,3 soon afterwards. The mortality rate then declined to just above the previous levels.

Commenting on Escom's instruction to people to shelter in their homes in the event of a radio-active leak, Dr Coogan said he had doubts about the real protection from gamma radiation when one considered the heavy shielding normally required to protect people from radio accidents of this sort.

Escom's other alternative — evacuation — posed many hazards of its own, he said, particularly if a radio-active release had already occurred. It was well-known that circulatory winds blew from the northern coast (the Koeberg site) out to Robben Island and then into Cape Town.

Quoting from the Three Mile Island Commission report, Dr Coogan said nuclear plants should be sited in remote places as an added contribution to safety.

CSO: 5100/6

BRIEFS

NATIONAL ACCELERATOR CENTRE--The status of the South African Accelerator Centre. A H Botha for the NAC staff. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p. 33. A National Accelerator Centre has been established in the Republic of South Africa in the vicinity of Cape Town. Two accelerators, an 8 MeV solid-pole injector cyclotron and a 200 MeV separated-sector cyclotron, are being built. The facilities of the Centre will be available for nuclear physics, isotope production and radiotherapy. Progress with the project and its present status are reviewed. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 pp 36-37]

8 MeV CYCLOTRON--Aspects of the design of an 8 MeV cyclotron as injector for a 200 MeV separated-sector cycltron. Z B du Toit, S J Burger, P J Celliers, G S Z Guasco, L Roels and H A Smit. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p 129. Certain characteristics, design aspects and calculations for the magnet, dees, extraction system and central region of the injector cyclotron are reported. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

BEAM INJECTION AND EXTRACTION--Beam injection and extraction for the separated-sector cyclotron of the National Accelerator Centre. P F Rohwer and S Schneider. Proceedings of Ninth International Conference on Cyclotrons and their Applications, held in Caen, France, Sept 7-10, 1981, p 481. The injection and extraction systems proposed for the NAC separated-sector cyclotron (k = 200 MeV) are described. A wide range of particles, including both light and heavy ions, with variable energy and beam intensities up to 100 uA have to be accommodated. Beam injection is accomplished with two bending magnets in the central region and an adjustable magnetic inflection channel in the pole-tip of one sector magnet to guide each beam onto its centred orbit. The extraction system consists of an electro-static extraction channel and two septum magnets, one of which is mounted inside the resonator. Results of orbit computations and specific design principles of the injection and extraction components are discussed. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

ORTHOGONAL QUADRUPOLE SYSTEM--An orthogonal quadrupole system. C M Merry and J C Cornell. Proceedings of Ninth International Conference on Cyclotrons and their Applications held in Caen, France, Sept 7-10, 1981, p 509. An arrangement of six quadrupole magnets is described which provides completely independent control of the horizontal and vertical phase-space parameters in a beam of charged particles from an accelerator. In fact the system requires only two quadrupole field strengths to be altered to adjust the horizontal size of the final waist, while the vertical waist size remains completely unaffected. Another two quadrupoles control the vertical parameters similarly. This results in a considerable simplification in manual tuning of beam parameters, even when computer-controlled or computer-assisted tuning has been used. The positioning of these quadrupoles can easily be determined using analytic techniques, and the relevant formulae have been derived and evaluated for a number of specific cases. Non-coincident horizontal and vertical initial waists (slits) have also been considered. The versatility of this system is demonstrated by means of beam envelope plots derived from a program using a matrix representation of beam transport elements. [Text] [Pretoria SCIENTIAE in English JUL-SEP 82 p 37]

CONSENSUS ON KOEBERG SAFETY--Koeberg Power station should not become operative until consensus had been reached on emergency measures to cope with a nuclear accident, the Progressive Federal Party spokesman on mineral and energy affairs, Mr John Malcomess, said yesterday. Mr Malcomess was reacting to a report in a Sunday newspaper in which the regional manager of Escom, Mr G. Hellstrom, was quoted as saying the formulation of safety measures for Koeberg was not the concern of the public. "If the public is kept in the dark on matters affecting their safety, they will naturally view the programme with suspicion," Mr Malcommes said. The Cape Town City Council was the official spokesman for the people of the Mother City, yet it had reportedly not been consulted on the proposed safety measures and was dissatisfied with them, Mr Malcomess said. "I, therefore, call on the Minister of Mineral and Energy Affairs to convene a meeting of the Cape Town City Council, the Divisional Council, Escom and the Atomic Energy Corporation as soon as possible to solve the problem." Mr Malcomess said it was apparent that safety measures at Koeberg had become a source of great controversy. "South Africa cannot afford this at the outset of our nuclear energy programme."--Sapa [Text] [Johannesburg THE CITIZEN in English 8 Nov 82 p 9]

KOEBERG WORKERS' SAFETY--Cape Town--The Cape Division Council went into closed session yesterday when a councillor asked if workers were to be given protective clothing in the event of a radio-active leak from the Koeberg power plant. The reply to Mr Clive Bilski's question, plus one on what Escom was doing to protect its employees, was given confidentially to councillors. During the public debate at the monthly meeting, Mr Clive Bilski referred to the council's civil defence plan. The report by the council, in whose area the nuclear plant falls, only deals with the immediate 16 km radius danger zone. The details of proposed "protective action" have caused a lot of concern in city council circles and have been described as inadequate. Both councils are installing their own radio-active monitors. Mr Bilski asked why the report had not mentioned protective clothing for council employees who may be called into the area to help in an emergency. He also asked what Escom was doing to protect its staff. Rising to reply, the Medical Officer of Health, Dr L.R. Tibbit, said he had more information but that it was confidential. [Text] [Johannesburg RAND DAILY MAIL in English 28 Oct 82 p 5]

CSO: 5100/6

BADEN-WUERTTEMBERG LANDTAG MODIFIES POSITION ON POWER PLANT

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 1. 14 Oct 82 p 8

[Text] New positions have become evident in the political discussion in the Baden-Wuerttemberg Landtag about the planned nuclear power plant Sued in Whyl--a symbol of the 10-year controversy surrounding nuclear energy in the FRG. The local government and the CDU fraction diverged from the projected annual growth rate figure of at least 5 percent for power requirements in the South-West. They base their growth rate figure of 3 percent on prognoses made by the FRG government. This means that the construction of a nuclear power plant in Wyhl is no longer considered to be as urgently needed as before. In spite of this,--according to a government declaration by minister president Spaeth--by 1992 there will be a deficit of 1,900 megawatt of nuclear power capacity in Baden Wuerttemberg, if Wyhl is not built.

The SPD in the Stuttgart Landtag, which became the leader in the fight against the construction of new nuclear power plants a few years ago under Eppler's leadership, also modified its position. In the words of fraction chairman Lang, it is no longer opposed to new nuclear power plans as a matter of principle, but in the Wyhl case it is of the opinion that a coal power plant in the South of Baden would suffice in meeting projected additional power requirements. The controversy ended in the question of what is more meaningful: the modernization of uneconomical and air polluting old coal power plants, or their replacement with the planned new atomic power plant in Wyhl.

Spaeth stated that because of air pollution caused by the old plants, the country could not afford to continue using a number of them after 1990, which would by that time have been in operation for 30 years. Without a new atomic power plant there would also be no possibility of reducing the 38 percent import figures for electrical current. Without the Wyhl plant, the considerable lack of cheap basic current would also continue. In its judgment in March of this year [illegible] a 7-year court battle for the first partial construction permit granted 1975, the Mannheim court has called all safety concerns by the project's enemies insignificant, and has even judged the 1975 level of safety technology sufficient. This decision would allow for immediate construction.

But in spite of this, according to Spaeth, the local government in Stuttgart would accept additional loss of time and higher costs in order to apply the latest construction technology of 1980 in Wyhl. For parts of the installation this would require a new application for permit. Spaeth wants to have talks with local politicians and clergymen of the communities and associations involved even before the decision. Then the decision regarding Wyhl is to be made, if possible still in the fall of 1983. It is questionable if construction will begin before the spring 1984 Landtag elections. Resistance is expected, not only from the opposition parties in the Landtag, the environmentalists, and the still very active Baden-Elsass citizens initiatives, but also from the local CDU, which wants to prevent at least the planned for cooling tower for the Wyhl project.

CHANGE OF POLICY ON HESSE REPROCESISNG PLANT

2. 19 Oct 82 p 4

[Text] The Hessen SPD minority government is obviously trying to get away from a nuclear reprocessing plant project in Hessen. There were already indications of this during the Landtag campaign, but now a first visible step in this direction was taken by Minister President Boerner. In a letter to the German Society for Reprocessing Atomic Fuels (DWK) in Hannover, he demanded a clear statement as to which of the sites tested in Hessen, Bavaria and in Rheinland-Pfalz the concern planned to chose for such an installation.

In case Boerner does not receive a satisfactory response, he is likely to withdraw his approval for nuclear testings in the North Hesse site Frankenberg-Wangershausen; he would then give the responsibility for it to the DWK. Boerner's move had been expected in Wiesbaden for various reasons. For one, the FDP, which until now had emphatically furthered the reprocessing in Hessen, is no longer represented in the cabinet after the retirement of its two ministers; secondly, Boerner, who had given his word to the government that he would test the reprocessing portion of the chain, no longer felt committed after the change-over in Bonn.

In his communication to the DWK, Boerner argued that the Hessen population could no longer be asked to bear the uncertainty as to whether the undertaking would in fact continue to pursue its application for permit for Frankenberg, or whether it would withdraw its application in favor of another site. Hessen had agreed to the application in 1979 under the condition that in the entire FRG only one single installation would be constructed for the testing of technology. Boerner refers to the fact that in the meantime sites in Schwandorf (Bavaria) and Kaiseresch (Rheinland-Pfalz) were being tested as possible alternatives. However, this has already been going on for months without Boerner making any inquiry regarding it at the DWK. Nor was this necessary, because Hoffie (FDP), his finance minister at the time, had made internal inquiries in Hannover already in March of this year as to whether there would be a continuous interest in a reprocessing plant in Hessen; as reason for his inquiry he stated that the DWK's various testing procedures had caused some doubts. The DWK administration attempted to alleviate these doubts in a letter to Hoffie dated March 20 of this year. It spoke of the "urgent necessity for a quick realization and thus the uncontested priorty" of the planned for 350 ton demonstration installation at a site in Hessen.

The society's activities in other lands--the letter continues--did not conflict with the interest in the planned for installation in Hessen, which is necessary not only for the safety of nuclear power plants but also for "the continuity of technological development." The administration promises in the letter that the project would be materialized "immediately" as soon as the suitability of a site had been proven and the first legal partial permit had been granted. "Possible and meaningful preliminaries" ---land purchase is probably meant by that--would "happen at the proper time." The administration hopes that with this letter it has made unmistakably clear its unchanged firm intention to make "a reprocessing plant in Hessen a reality."

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CSO: 5100/2505

FEDERAL REPUBLIC OF GERMANY

RESEARCH MINISTER TO PROMOTE DISPOSAL TECHNOLOGY

Duesseldorf HANDELSBLATT in German 7 Oct 82 p 3

[Report by wff, datelined Bonn, 6 October 1982: "Highest Priority for Disposal Technology"]

[Text] Heinz Riesenhuber, new federal minister for research and technology, intends to emphasize the promotion of nuclear disposal technology.

Last Wendesday, in his first press conference since taking office, the minister also confirmed the key issues of his policy as earlier stressed in remarks to HANDELSBLATT (see HANDELSBLATT, 4 October 1982): As quickly as possible to secure financing for the advanced reactor types fast breeder and high temperature reactor, and more emphatically promote the transfer of technical knowledge to actual practice.

Riesenhuber said he intended to emphasize the promotion of disposal concepts. This is a condition for the responsible use of nuclear energy. At the same time he wishes, together with the Federal Minister of the Interior, the Federal Minister for Economics and the Laender, to improve the organizational and legal prerequisites. The new minister hinted that, possibly, not all risks in terms of time and costs had been ascertained with regard to nuclear disposal. He is going to thoroughly study the issue, because a proper opening balance is crucial.

Riesenhuber left no doubt that he expects industry to provide a greater contribution to the advanced reactor types. The pressures here are enormous, and the situation cannot be dealt with exclusively by spending public money. In fact Riesenhuber foresees further moneys from the general budget to a very limited extent only. The important partial construction permits for the fast breeder and the lifting (he recommended) of the parliamentary reservations with regard to the start of operations, resulting from the majority decision by the Bundestag Energy Inquiry Committee. have improved the climate for a contribution from industry. The current scenario permits the restoration of planning security. Riesenhuber expects the reassessment of the new projects, initiated by his predecessor von Buelow (SPD), to be concluded in a few weeks time. He will then have a basis for factual negotiations with industry regarding both projects.

Riesenhuber says he wants to cautiously set new emphases for the coming years. He also intends to maintain continuity regarding personnel and has therefore asked State Secretary Haunschild to remain in office. At the same time he considers it imperative to exmine whether the multitude of pojrects is in fact necessary and manageable, and where new key issues are likely to emerge. Studies will have to determine, for example, what tools of indirect research promotion might be more emphatically employed, for example for the microelectronics program. The new minister also wants to find out why it is that, despite a relatively large allocation of money to basic research, the output of real top performances at international level is not very great.

Promotion of basic research, though, is bound to continue a priority for the ministry. Riesenhuber will try, in the meaning of better acceptance of large-scale technical establishments, earlier to spot risks and quickly pass them on to research and development instead of, after the event, imposing environmental framework conditions on new plant.

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CSO: 5100/2509

ITALIAN-MADE HEAVY ION ACCELERATOR TANDEM XTU DESCRIBED

Milan SCIENZA E VITA NUOVA in Italian Nov 82 pp 71-75

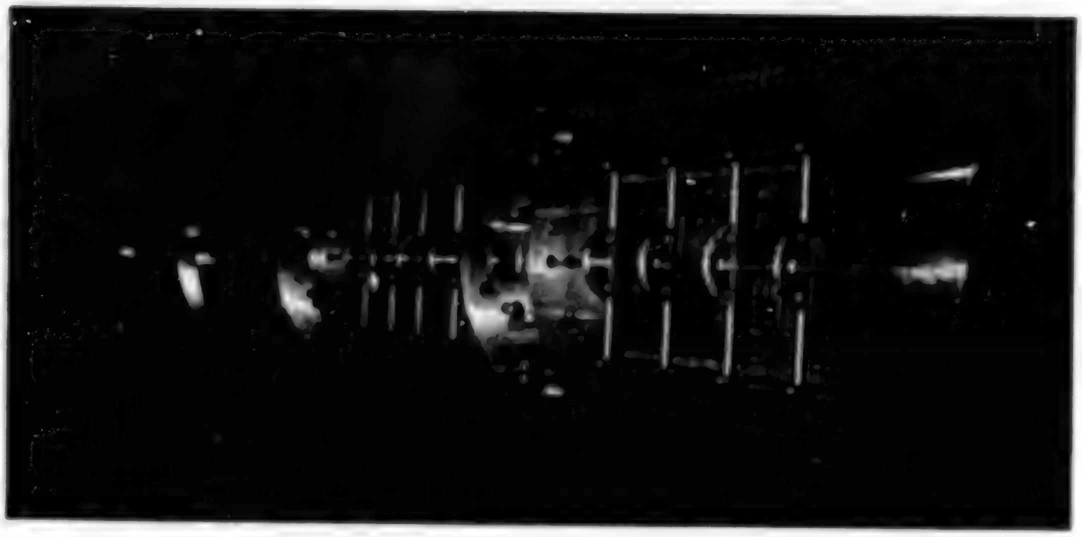
[Article by Piero Piazzano: "In Italy, the Most Powerful Heavy-Ion Linear Accelerator--A Probe into the Nucleus of the Atom"]

> [Excerpts] The Tandem XTU, an accelerating machine that can be of service to physicists, physicians and engineers, is about to go into service at Legnaro. The designer talks about it.

"Let us imagine that the Martians take it in mind to study the organization of human society and that they decide to tackle the problem by dividing into groups. The first group would be able to study persons individually as elementary constituents of society; the second group could take on study of the primary nucleus of organized society, the family; and the third would concern itself with the organization of the city, or the state, as an example of organized society in a complex form. For each of the three groups we can have a corresponding group of physicists: respectively, the subnuclear physicists, who study the elementary particles; the nuclear physicists, who study the atomic nucleus; and the atomic physicists, who study the structure and organization of condensed matter."

This analogy between physics and sociology is by Prof Renato Angelo Ricci, in charge of Project Tandem in the National Laboratories of Legnaro (province of Padua) of the National Institute of Nuclear Physics (INFN). As a "Martian," Prof Ricci belongs to the second category: he is a nuclear physicist, and Project Tandem, for which he is responsible, is one of the most advanced research instruments for those who study atomic nuclei.

The Tandem XTU accelerator was officially inaugurated on 21 January 1982, on the occasion of the 20th anniversary of the establishment of the National Laboratories of the INFN at Legnaro; but, adds Ricci, "the real scientific inauguration will take place next spring, when an international meeting devoted to the physics of heavy-ion accelerating machines will be held at Legnaro." By that time, the preliminary checkout and performance-characteristics testing of the machine will have been completed, the necessary authorizations from the ENEA [National Committee for Research and Development of Nuclear and Alternate Energy] and the competent ministries will have arrived, and the machine will have begun to function full-time.

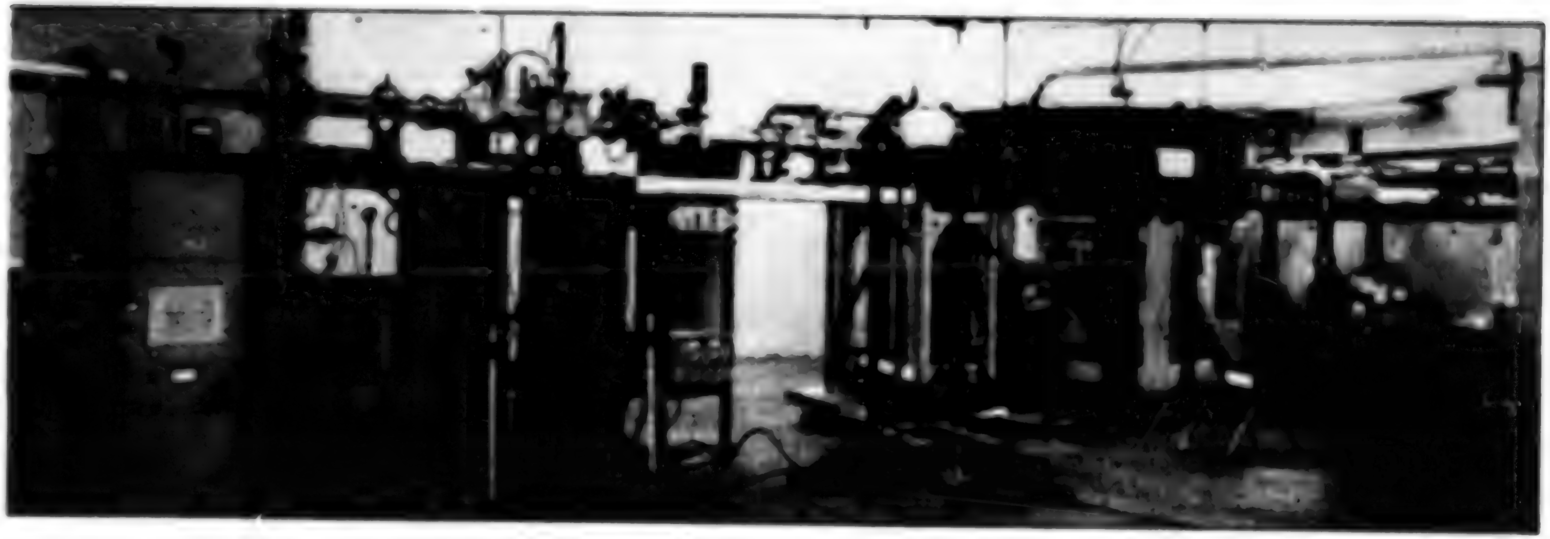


The interior of the Tandem of Legnaro. It will be used for study of the structure of the atomic nucleus.

Ricci says: "A machine like the Tandem can be used to recreate in the laboratory the reactions that nuclei produce inside stars: in the Tandem, the reactions are primed in order for nuclei that are made to 'melt,' breaking the Coulomb barrier, to accelerate, while in the stars, the energy is furnished when the stars 'boil'--that is, when several elements 'burn' and produce others."

One function of the Tandem, then, is to reconstruct the "unicorn," or the "mammoth," or the future products of evolution in the zoology of nuclei; but we think we understand that this function is not the only one.

"No, of course not. We know well only 10 percent of the matter of which the universe is made--500 nuclei out of 5,000--and the Tandem can help us amplify this knowledge. But the Tandem can also be used to produce reactions that prime new phenomena that we do not know--for example, the fact that matter is organized in so-called giant structures. Clarifying these phenomena makes it possible to lay a bridge between nuclear physics and subnuclear physics, because with these experiments it can be verified whether the primary interactions proposed by the theories of subnuclear physics are really the valid ones for describing the behavior of the first phase of construction of matter."

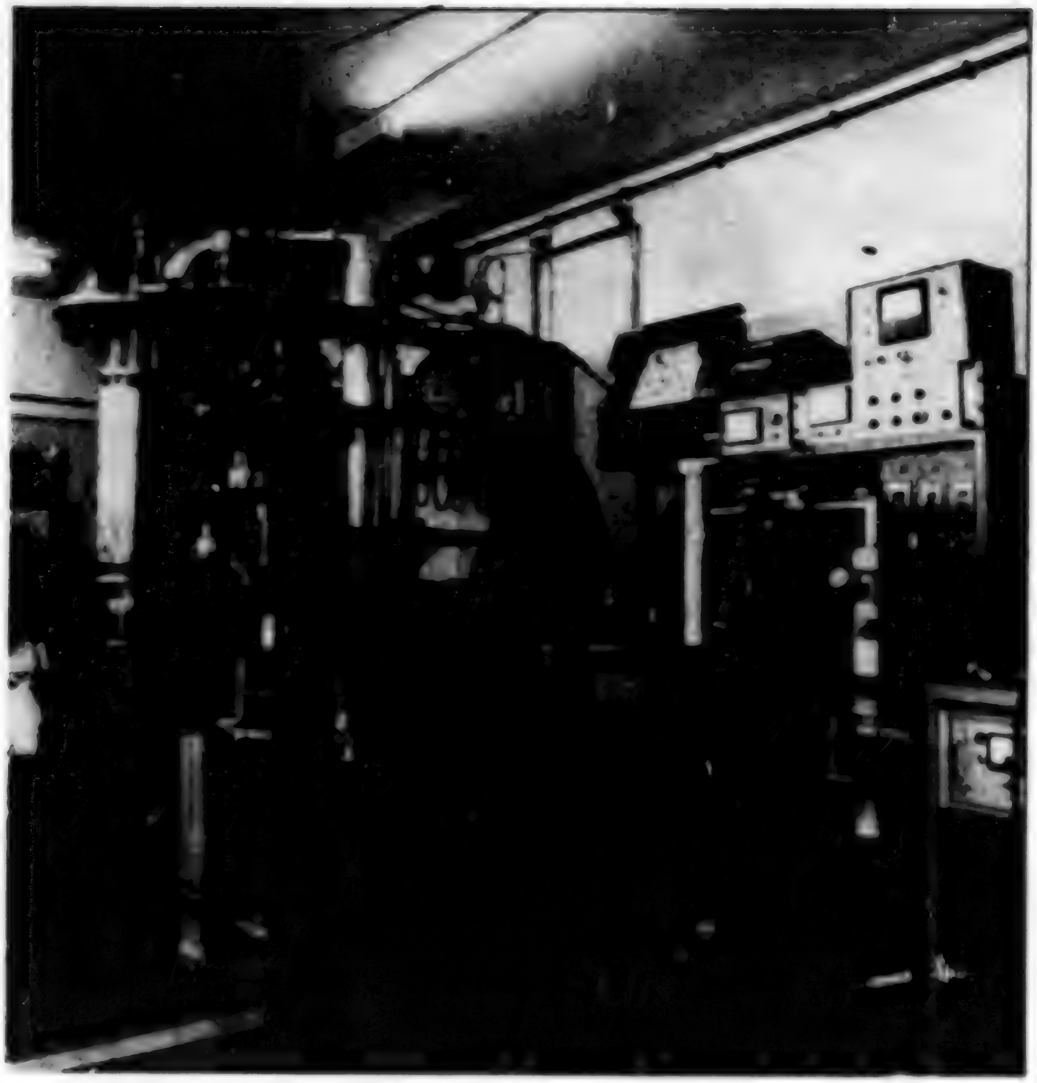


View of the tube in which the ions accelerated at high energy travel and of the magnet that directs the beam into the channel. The measuring instruments are placed at the end.

And there is no lack of surprises: one sees in the following article, for example, what has happened at Berkeley, where a heavy-ion accelerator has discovered strange nuclear structures that the physicists have christened with the name of "big anomalies."

The Function of the Microelements

But in nuclear physics, not only pure research is done: the Tandem can be used also, and extensively, for doing applied research--that is, research that is immediately transferable to technology, in



Refrigerator set with which the target is cooled to 15 mK, a temperature close to absolute zero.

many sectors. "For example," Prof Ricci continues, "in the field of biophysics, the techniques of nuclear spectroscopy are far superior to those of chemical analysis. With our accelerator, it will be possible to improve the techniques for detection of microquantities of elements present in organic tissues. Here at Legnaro, the group directed by Prof Moschini, professor of medical physics in the University of Padua, is concerned with these matters."

The use of accelerators in mass spectroscopy is not new and is based on the effects that proton bombardment produces on the field under study; and from the effects one can go on to the composition of the sample, with very high precisions. With a heavy-ion accelerator such as the Tandem of Legnaro, even more can be done: the nuclei themselves of the substance under examination can be accelerated and a "nuclear spectrum" of its components can be obtained as a result, with a precision that makes it possible to recognize one atom dispersed among 10 million different atoms.

"One interesting development from these techniques," wrote Prof Moschini with regard to the Tandem's applications to biophysics, "has to do with study of tumoral processes, which, it seems, can be promoted or inhibited by the presence of microscopic quantities of elements."

Analogously, it will be possible to use the Tandem for knowing the age of organic and inorganic substances by applying with greater precision and on smaller samples the dating methods based on radioactive decay. Finally, studies will be done with the Tandem on materials, both from the point of view of their composition and as regards their behavior in the presence of radioactive nuclei.

It is a field of research that brings us close again to the application that made nuclear physics famous: nuclear fission and its peaceful applications (reactors) and military ones (bombs).

But apart from the research on the properties of materials, as referred to above, the physicists who will work with the Tandem will not be concerned with either of them.

"No," concludes Prof Ricci, "those sectors no longer have anything to do with physics; they have now gone into the field of engineering."

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TESTING FEASIBILITY OF BURYING NUCLEAR WASTE IN ROCK CONTINUES

Tests in Granite Mine Tunnels

Stockholm DAGENS NYHETER in Swedish 23 Oct 82 p 13

[Article by Eric Dyring: "Nuclear Safety Tested in Depths of Mine"]

> [Text] The durability of Swedish granite is being tested 53 kilometers north of Orebro and 360 meters under the surface. Can it safely retain the highly radioactive waste from nublear power plants?

The old Stripa mine in Bergslagen in its old age has become the home for an intensive international research project.

Research work has been going on since 1977. The whole thing began the year before. The Swedish Nuclear Power Plant Act demands that power companies must show the harmless nature of the entire nuclear power system. Otherwise no new nuclear power plants could be placed into operation.

One of the big problems concerned the safe handling of nuclear fuel. Svensk Karnbransleforsorjning AB (SKBF) was formed to develop the route for nuclear fuel from discovery to final safekeeping.

Stripa Mine

At the same time the mining company Stallberg AB decided to shut down the Stripa mine in Bergslagen. Since the 1400's it had produced iron, but now it was finished. Around the old ore-bearing deposit lay granite, ideal for the study.

On location there was already a mineshaft, passageways, material and trained personnel.

The mine also extended 400 meters down into the earth, which was an advantage. It was considered that the highly active nuclear waste should be placed about 500 meters deep to obtain sufficient safety. SKBF decided to act, and rented the mine.

When these plans were disclosed at a conference in the United States the Americans were interested. They also wanted to research the problem but had no shut-down mines available. They had only the military installations from the end of the 1940's at Hanford in the state of Washington, Savannah River and the Climax project in Nevada. It would cost time and money to create their own test mine. Furthermore public opinion is just as vigilant in the United States as it is in Sweden when dealing with nuclear power activity.

The United States joined and the Stripa project became international. Today it is also an OECD project, through its Nuclear Energy Agency. Canada, Finland, France, Japan and Switzerland are cooperating.

"Sweden is the driving force behind the Stripa project," said the project leader Hans Carlsson of SKBF to DAGENS NYHETER. "Through cooperating in research on the suitability of Swedish granite, Sweden and other participating nations are getting a shortcut to knowledge."

No Storage

"There will be no nuclear waste stored in the Stripa mine," pointed out Hans Carlsson. "It is only used for research and method development."

The Stripa project is now entering its seventh year. The first test period ended in 1980. The second will continue until 1984.

There are many questions that we are trying to get the answers to in Stripa.

The radioactive waste gives off heat. Will that change the properties of the granite? This has been investigated by heating the rock electrically. The investigations, which are now completed, show that it does not effect the solidarity of the granite.

Another important question is how ground water flows through the cracks in the granite. The results show that the rate is very slow, slower than one billionth of a meter per second. That is many times slower than the rate of flow through porous rock.

Decomposition

Just now they are measuring the significance of the chemical composition of the ground water. What is the corrosive effect on the material which will enclose the waste--copper and glass?

And what happens when the enclosing material decomposes, because it is going to do so after a long time. How is the rock going to be effected by the released radioactive substances and how will they spread? These investigations are being conducted by using different kinds of tracers, among other things.

Another area of research involves testing different kinds of fill material.

Now plans are being made for a third test period, which will extend to the end of 1986. England will also participate. Hans Carlsson says that then we will develop, among other things, new methods to map the structure of the granite without boring into the rock. They expect to test seismic methods which can reach 1 kilometer, plus radar. The latter reaches only 50 meters, but gives very detailed information.

The cost for the test period 1980-1984 is a total of 50 million kronor. The new test period is estimated to cost 65 million.

"The international cooperation is going well, but with certain interruptions," said Hans Carlsson. "President Reagan's curtailment policy has also hit the Stripa project. The Americans have not written the final reports according to the plan.

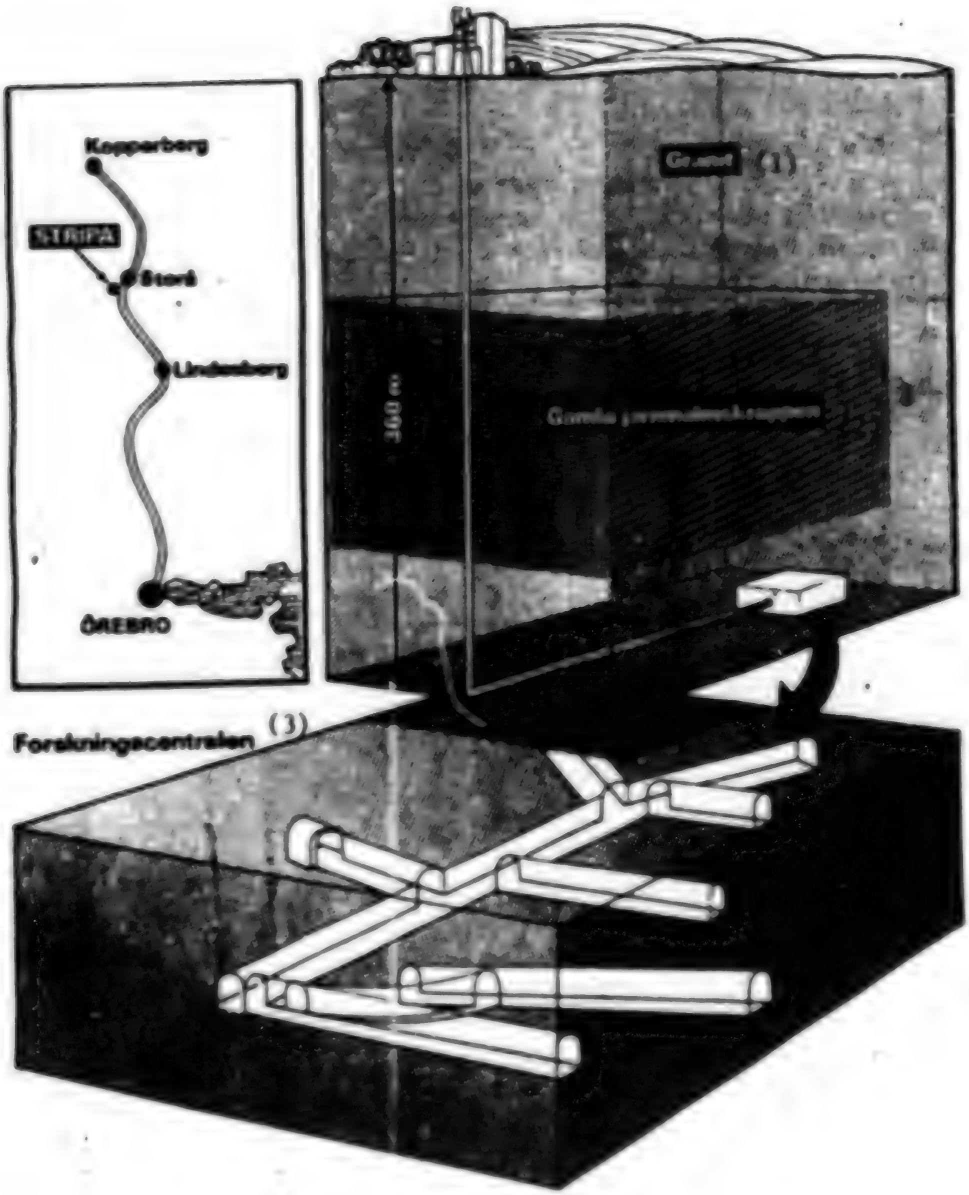
"The shortage of money makes the work go more slowly. That is irritating. But the United States is not expected to withdraw from the cooperation," said Hans Carlsson.

Active Opinion

Next week the researchers and experts are meeting at a working symposium in Stockholm to present and discuss the results from Stripa.

Method development and test are only a first step to safe waste storage. The road toward the first Swedish graveyard for highly active waste from nuclear power plants is a long one. It has to pass through economic and political decisions.

Public opinion is vigilant. As soon as a drilling team starts investigating a rock formation, the local opposition is quickly heard from.



Key: (1) Granite
(2) Old iron ore body
(3) Research station

Caption: 360 meters beneath the old shaft building at Stripa mine in Bergslagen there is a research station. They are investigating, among other things, what happens when the primary rock formation is heated up by radioactive waste.

Effects of Radioactivity in Ground Water

Stockholm DAGENS NYHETER in Swedish 23 Oct 82 p 13

[Article by Roland Gyllander: "Is Waste in Bedrock the Only Possibility?"]

> [Text] To bury nuclear waste in stable bedrock is regarded the world over as the only possible way to be fairly safe that it will continue to be isolated from the biosphere for thousands or millions of years.

To send the waste with a space rocket into the sun, or to bury it deep in the sea where the movement of the earth's crust will grind it down into the earth mantle would perhaps be the most effective, but these methods are unreasonable from a technical and safety standpoint.

Even if the waste is encapsulated in lead and titanium and copper and packed in bentonite clay which expands and seals when the ground water, after a couple of hundred years fills the waste storage, then the capsules after thousands of years will corrode apart and the waste will leak out into the ground water. The uncertainty is over how long a time that will take.

Measurements have shown that it normally takes thousands of years before ground water in finely cracked granite at a half kilometer's depth has returned to the surface. Only in extremely unlucky cases should any noteworthy radioactivity from glass-encapsulated waste reach the surface before it would disappear through decomposition. Here the greatest risks instead are to future tunnel construction or deep water wells in the area.

If the waste instead consists of exhausted fuel elements with large contents of very long-lived radioactive substances--among other things plutonium, neptunium, uranium and radium--the radioactivity is going to reach the surface in amounts which, according to SKBF's calculations give doses of 0.7 mSv (millisievert) per year in 1 million years (in the worst case) or, more likely, 0.1 mSv in 70 million years.

The natural background radiation from the earth and sky now give us 0.7-1.4 mSv radiation dose per year, depending on where we live. The international radiation protection recommendations which Sweden approved give a maximum limit of 0.5 mSv extra radiation per year to the public, or 0.1 mSv in cases where there is prolonged radiation year after year.

The test drilling now going on is to find rock which is free from large crack zones where future dislocation can be expected to take place, but which are still rather finely cracked. Entirely crack-free rock should certainly be ground water free, but because of its rigidity a risky storage place for very long and geologically uncertain time frames. Finely cracked rock is, on the other hand, elastic and functions as a groundwater filter where radioactive substances to a certain extent fasten to the walls (sorption).

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NUCLEAR WASTE FROM FORSMARK PLANT TO BE PUT UNDERGROUND

Stockholm DAGENS NYHETER in Swedish 29 Sep 82 p 6

[Article by Anna-Lisa Backman: "Osthammar Says Yes to Storage"]

> [Text] Last Tuesday night Osthammar town government said yes to the nuclear dump in the bed-rock under the Oresundsgrep at Forsmark. This decision means that the local veto right was not used.

Together moderates and Social Democrats went against members of the Center Party, the Liberal Party, and the Communist Left Party. After the decision, shouts of "Ugh!" and "Hell!" were heard in the meeting room.

After barely an hour's loaded debate a decision was made agreeing to the request of Swedish nuclear resources to build a storage for the final storing of low and medium active waste in the Oresundsgrep. Four weeks ago it was decided to table the question before the election. Now, after the election, the positions were the same as earlier. The Social Democrats were all but one for the proposal. This was Goran Karlson from Gimo who left the meeting and was replaced by a substitute who voted the party line. Goran Karlson emphasized, however, that there was no split between himself and the party.

Meeting Halfway

By accepting the proposal, the town government met the housing authority halfway, as it wanted an answer before the end of September. Several members of the Center Party pointed out that one did not have to follow the authority's request that strictly in such an important question as the decision about waste, but the yes line still won.

At first one voted on reremittance. The position was 30 nays and 19 ayes. And the same numbers were then repeated the other way around when it was a question of agreeing to the storage.

Town government member Edvin Tallberg (S.D.) pointed out that one agreed on the condition that one can have renewed veto right to a planned addition to the storage.

In the debate it was, however, pointed out by the Center Party that the present government cannot promise how future social democratic governments will act on the question.

On the whole, the Social Democrats did not argue much for their position, but tried to keep the promise they had given before the election, namely that the storage would be built. Neither did the members of the Moderate Party say much during the debate, but that one should be pleased that there is a company like Swedish Nuclear Resources that wants to properly handle its waste.

Pleading

One had simply kept the positions from the great debate before the election, which at that time led to tabling.

Still, members of both the Center Party and the Communist Left Party pleaded with the town government to consider the fact that one was deciding upon a great question of the future.

Town government member Arne Hansson (C), who together with Edvin Tallberg runs the district, criticized the housing authority for having forced forth a comment from the district before it had turned all statements from the remitting authorities over to the district.

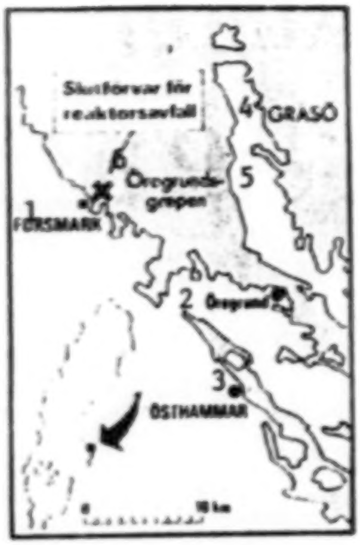
"All investigations according to the nuclear law and the energy law should have been submitted to the town government before we made a decision," he said.

What was now on the town government's table were some newly received sheets of paper that had to be read during the half hour the council adjourned.

Government

Thus, the decision of the town government in Osthammar means that the strong possibilities of refusing the storage were not used which are allowed in the building law. Instead one must now await state considerations and other reports from the nuclear power inspection and the Swedish radiation defense institute. Finally, the government will decide whether the storage may be built.

Because Osthammar is a very vast district, local government meetings are held in different places in the district, and this evening it was at the Central School in Osterbybruk. Unusually many listeners sat along the walls, mostly local advocates of the People's Campaign against Nuclear Power.



1. Forsmark

2. Oregrund

3. Osthammar

4. Graso

5. Oregrundsgrep

6. Final storage for nuclear reactor waste.

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